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Con	K.Co INVEST	8	28495	4567	01.0	LIIO	25/60		10077			2/350		200	26000														
	E 01 L 8/18/82 PROPOSAL	*	34682		20.77	/64/	13343		47416	1, 11		64343			0				ž.										
	CURRENT P		31906	4777		20001	26744		72482	1313		20150		0	0														
· .	900F SEPT '81 TTD SALE		57.5	3.7		20.01	16.0	89.4						<b>E</b>	- 11 1	<b>X</b>	* 4	~5	Ç										
	-		WI TOWN			20 Co Co	F		É	- 01				ENT/MAK	C INVEST														
61			WOOD TO STORY	N SUD FOOL			T0\$1 ×6	ToTA	Dave	1 1		NVENTER	e d	K.Co IN VESTMENT/IGHT	TOTAL CAPITAL INVESTMENT		1			•								ļ	
•			CIXI E	28 30		THERET	WOODTOX	F	90	2		NVE		Kiço	TOTAL														

#### KOPPERS COMPANY, INC.

### APPROPRIATION REQUEST SUPPORTING DATA (IN THOUSANDS OF DOLLARS)

ADDITIONAL PROFIT AT TIME OIL WITH K.CO INVESTMENT OF \$35000 FOR FIVE YEARS

DIVISION:		APPROPRI	ATION NO	).: 		
EAR	NINGS ESTI	MATE				
TITLE	1ST. YEAR	2ND. YEAR	3RD. YEAR	4TH. YEAR	5TH. YEAR	AVE. FOR 5 YEARS
1. NET SALES PROFIT	19	19	19	19	19	19
2. NET RAW MATERIAL COST		]				
3. CONTROLLABLE OPERATING COSTS						
4. DEPRECIATION AND APPLICABLE DEPLETION	5	5	5	5	5	5
5. OTHER NONCONTROLLABLES						
6. TOTAL PLANT PRODUCTION COST						
7. PLANT PROFIT ON PRODUCTS SOLD	14	14	14	14	14	14
LESS: OVERHEAD:						
GEN. & ADM. EXPENSE ( % Of	F 1)					
CENTRAL STAFF EXPENSE ( % OI	F 1)					
SELLING EXPENSE ( , % OF	F 1)					
DIV. & CENT. R&D EXP. ( % OI	F 1)					
8. DIVISIONAL OPERATING PROFIT		1				
8A. LESS: CORPORATION OVHD ( % OF	F 1)					
9. INCOME BEFORE INTEREST AND TAXES	14	14	14	14	14	. 19
10. PROVISION FOR INTEREST ( 14 % OF 1/3 OF L)	23) /	1	1	1	1	/
11. INCOME BEFORE TAXES	/3.	13	7.3	13	13	/3
12. PROVISION FOR INC. TAX ( 50 %OF	1N 7.	7	7	7	7	7
13. NET INCOME	4	6	6	6	6	. 6
% RETURNS ON AVG. NET INVEST.						
14. DIV. OPER, PROFIT (8÷	23)	78	108	175	467	178
15. INCOME BEFORE INT. AND TAX (9÷	23) 4(01	78	108	175	467	· 178
16. ADJ. NET INCOME ÷AVG. NET INVEST. (13 + 50% L. 10 -		33	76	75	200	. 76,
17. % RETN. ON SALES (13 ÷	7 7	1				
ESTIMAT	TE OF INVES	TMENT		<u> </u>		
AT STAI		2 YEARS	3 YEARS	4 YEARS	5 YEARS	AVE. FOR 5 YEARS
18. GROSS PLANT, PROP. & EQUIP. 25	2.5	25	25	25	25	" رح
19. LESS: DEPREC. RESERVES	5	10	15	20	2)	/3
20. NET PLANT, PROP. & EQUIP. YR. END 25	20	15	10	5_	0	/3
21. AVG. NET PROPERTY FOR PERIOD XX		18	13	8	3	13
22. AVG. WORKING CAPITAL FOR PER. XX	x Z		_	\ <del>-</del>	_	• —
23. AVG. NET INVESTMENT (21 + 22)	23	18	13	8	3	13
CASH PLOW A	AND PAYOUT	•				
24. NET INCOME (LINE 13)	6	6	6	6	6	
25. DEPRECIATION & DEPLETION (LINE 4)	3	5	5	5	5	
26. ANNUAL CASH FLOW (24 + 25)	177	11	1)	11	11	
27. ACCUMULATED CASH FLOW	1//	22	33	44	55	
<u></u>			ENRS	PAY BA	<del></del>	l

\*TO ADS 112 AS INDICATED THEREON

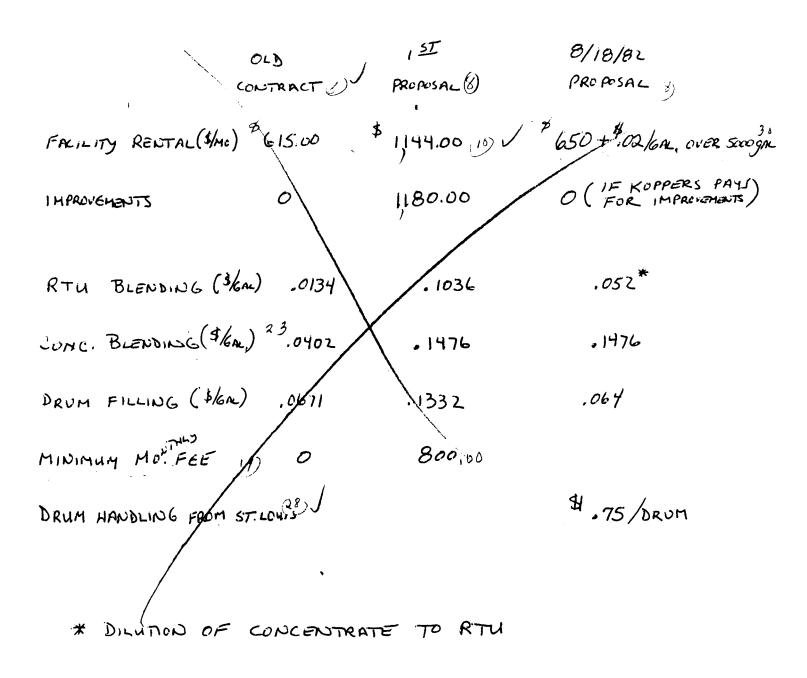
NOTE: ITEM 6 SHOULD BE SUPPORTED BY DETAILS APPLYING TO THE SPECIFIC CASE.

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ADS-230 Rev. 5.

### TIME OIL PROPOSALS



61

10/13/82

KOPPERS COMPANY INC., FOREST PRODUCT GRP.
SPECIALTY WOOD CHEMICALS

SALES BY PRODUCT REPORT SEPTEMBER, 198	
DALES BY PRODUCT REPORT SEPTEMBER, 190	2

LOCATION	743	PODTIANO	WITC	CODM	

LOCATION 743 PORTLAND WTO	<u> </u>	<del></del>	CURRENT	MONTH		cuas e	IT AR TO	DATE	
		QUANTITY	SALES AMT	PROFIT	% P	QUANTITY		PROFIT	% P
WOOD TREATING CHEM							<u></u>		
VOODTOA PRE-PRIME CONC SL	55 GAL DR GL	165	850	266	31.3	165	850	266	31.3
VOCOTOX PRE-PRIME-T RTU	BULK GA	6982	15360	2850	18.€	68444 •	150392	30942	20.5
NOODTOX PRE-PRIME-T RTU	55 GAL DR GA	0	ò	. 0	. 0	3025 -	10136	3538	34.9
NOODTOX PRE-PRIME-T CONC	55 GAL DR GA	330	1700	556	32.7	1265	6323	1986	31.4
NODDTOX 140-T CONC	BULK GA	1031	3196	649	20.3	14592	41870	6624	15.8
NR 340 CONC	408 LB DR LB	0	0	0	٠.	24838	9711	2402	24.7
TIMBERTOX 40 CONC	55 GAL DR GA	2970	14660	3374	23.0	6820	31877	€235	21.8
PETROSET 11 PTLD STOCK	460 LB DR LB	1365	2143	561	26.2	2730	4286	1122	26.2
WK-60 SOLVENT PTLD	55 GAL DR GL	660	1636	402	24.6	2420	6000	1476	24.6
WOOD TREATING CHEM TO	OTALS	<del></del>	39545	8658	21.9		261445	55212	21.1
PORTLAND WIC FORM TO	OTAL S		39545	8658	21.9		261445	55212	2:.1
						1464	(57%)		
						71 707			
						52880			
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<b>D</b> •			· · · · · · · · · · · · · · · · · · ·						
OCATION 743 PORTLAND WITH		··						PAGE N	2

### KOPPERS COMPANY INC. FOREST PRODUCTS-EXCLUDING ARCH BLDG PROD, DANZLER & HONOLULU

SPECIALTY WOOD CHEMICALS SALES BY PRODUCT REPORT SEPTEMBER, 1981

10/14/81	₩.			SEPTEMBER, 19					PAGE	. NO
LOCATION 743 PORTLAND WTC FORM	M			CHODE N	T MONTH		CURRE	ENT YEAR TO	DATE	1
PRESERATIVE / PROD	DUCT		QUANTITY	SALES AMT	PROFIT			SALES AMT		% P
R.R. DIL USED IN TRM									,	
FREIGHT ADJUSTMENTS			0	16	16	100.0	0	<u>57</u>	57	100.0
R.R. OIL USED IN TRM TOTALS			• • • • •	16	18	100.0		57	57	100.0
WOOD TREATING CHEM										•
WOODTOX 140-T RTU BULL	κ .	GA	0	O	o	.0	1222	2492	634	25.4
	GAL DR		0	O	0	. 0	6050	14703	2223	15.1
LST CO-SOLVENT 11 PTLD STOCK401			0	- 0	10	. 0	9480	3792	1,600	42.2
MODDTOX PRE-PRIME-T RTU BULL		GA	2493	5479	1229	22.4	68720 7205	146046 19026	32900 3724	22.5 19.6
	GAL DR		55 0	209 0	91	43.5 .0	935	4621	1590	34.4
#00DTOX 140-T CONC BULL	GAL DR	GA GA	ŏ	0	0	.0	30909	85011	13550	15.9
	GAL DR		ŏ	Ŏ.	ŏ	.0	4235	12391	.985	7.9
	LB DR		7752	2790	550	19.7	35088	12511	2927	23.4
	GAL DR		.,,,=	0	0	٥.	505	1912	:382	20.0
TIMBERTOX 40 CONC BULL		GA	0	Ō	0	. 0	500	1875	399	21.3
	GAL DR	GA	110	605	219	36.2	12650	54260	11210	20.7
PETROSET 11 PTLD STOCK 460	FB D8	LB	0	0	0	.0	8220	1,2878	3806	29.6
WOOD TREATING CHEM TOTALS				9083	2089	23.0		371518	75 930	20.4
PENTA CRYSTALS								:	•	
PENTA-R PTLD STOC K 50 H	LB BAG	LB	500	347	107	30.8	6500	4075	952	23.4
PENTA CRYSTALS TOTALS	- Maries to 1 - Lorenton			347	107	30.8	•	4075	952	23.4
PORTLAND WTC FORM TOTALS				9446	2212	23.4		375650	76939	20.5
				- · · · -	4412	43.4		313030	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	20.5
FINAL TOTALS				891342	164616	18.5		7793352	1573363	20.2

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LOCATION 743 PORTLAND WIC FORM

PAGE NO. 10

10/14/81	FORES	IT PRODUCTS-EX	CLUDING AR SPECIALTY W SALES BY	PPERS COMPA ICH BLDG PRO IOOD CHEMICA PRODUCT RE EEPTEMBER. 1	D.DANZLER & LS Port	нойогл	ιυ		PAGE	ENO '
LOCATION 743 PORTLAND WTC FO	RM									,
PRESERATIVE / PR	ODUCT		OHANTITY	CURREN	T MONTH	<b>*</b> 0	CURR	ENT YEAR TO	DATE PROFIT	<b>4</b> P
				SAFES VIII	P ((0) 1)	~ F	QUAIT 111	- ACE 3	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<b>~</b> ·
R.R. DIL USED IN TRM										
FREIGHT ADJUSTMENTS			0	16	16	100.0	0 _	57	57	100.0
R.R. OIL USED IN TRM TOTAL	s			16		100.0			57	,
WOOD TREATING CHEM										,
						:	1000	2492	634	25.4
### ### ### ### ### ### ### ### ### ##	CAL OF C	A	0	. 0	0	٥.	1222	14703	2223	
IST COLONIVENT 11 PTIN STOCKAN	THE DE L	A		. 0	0	.0	9480	3792	1:600	
AUULTUR DES DEINE T BIN	1 6 9 6	.D	2403	5470	1220	22.4	68720	146046	32900	
#OODTOW PRE-PRIME-T BTILL	GAL DE G	A.	2733 85	200	91	43 6	7205	19026	3724	
#OODTOX PRE-PRIME-T CONC 55	GAL DR G	A		. 209	91 0	73.5	935	4621	1590	
#OODTOX 140-T CONC RU	IK G	Ā	ŏ	<u>.</u>	ŏ	. 0	30909	85011	13550	
MOODTO X 140-T CONC 55	GAL DR G	Ā	ŏ	Ŏ·	ŏ	. 0	4235	1.2391	.985	
#R 340 CONC 40	8 LB DR L		7752	2790	550	19.7	35088	12511	2927	23.4
TIMBERTOX 40 CONC W/O DRS 55	GAL DR G	i.	0	0	0	.0	505	1912	:382	
TIMBERTOX 40 CONC BU	LK G	À	•	_			505 500	1875	399	
TIMBERTOX 401 CONC 55	GAL DR G	A	110	605	219	36.2	12650	54260	11210	20.7
TIMBERTOX 40 CONC BU TIMBERTOX 40' CONC 55 PETROS ET 11 PTLD STOCK 46	O LB DR L	.8	0		0	.0	8220	1.2878	3806	29.6
WOOD TREATING CHEM TOTAL	\$	and the second s		9083	2089	23.0		371518	75930	20.4
PENTA CRYSTALS							_		;	
PENTA-R PTLD STOC K 50	LB BAG L	.8	500			30.8	6500	4075	952	23.4
PENTA CRYSTALS TOTAL	S			347	107	30.8	•	4075	952	23.4
PORTLAND WIC FORM TOTAL	S			9446	2212	23.4		375650 :	76,939	20.5
FINAL TOTAL	s			891342	164616	18.5		7793352	_1573363	20.2
									,	

June mining Time Oil Portland 6/15 \$ 48,400 ROW Moth \$ 15,600 FINISHED PROD \$ 1600 CONTRINERS 48,400 = 25% MINERAL SPIRITS Finished goods 774 1 of Epott 142-114-19. Tank Can Brapaine lane 8000-10,000
RTV 7000-8000 Drungs Timber 40 At Jane 50

10 12 - 340 et 10) 61 TOLS009992

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NORMAL INV. CUR	BENT	·	CASCIO CASCIO	5:	T. Buch	
MOODTOX PREPRIME CONC  PTU  MITHERAL SPIRTS  TIMBOR TOX 40 DRUMS  (UCCID TOX 140 T (1))  (UR 340	6000	1.81 6.670 1.46 12410 3.58 1024 2.398 14388 2.694 1077	2800 6000 4000#	1.95 1.46 3.72 2.54 12746	9000 3.07 7000 179 8500 (1.46/ 2800 3.80 — 3.02 4000 3.02	GAL
		50570	•			

# WOODTOX 5 (8.43%)1:5 BLOND

	ST. Louis	PORTLAND
RAW MATE	2.490 ,031	2.76
ONHD	.062	

	FR	70	FLIGHT	<u> </u>	16	HOTEL	COMPANY
SUNDAY 2)	ATZ	SEN	E A 94	6 4%	8 3A/p	SHERATON 206-226-7700	
MONDAY 29	SEX.	PORT.	En 86	6 <sup>19</sup> /P	7 º%	5HERATON 503-288-7171	TIME OIL 206.285-2400 R. ABGN BROTH
TUES 30	PORT.	\$. <i>F</i> .	UA 1275	609p	7 34/6	8 EST WEJEN 415-792-4300	71ME OIL 503-286-1611 NEIL WALLS
WED. 7	S.F	_				BEST WEST 415.792-4300	JONES HAMILTON) 415-797-2471 KERN HAMILTON
THURS	SF.	РІП	VA 486	10%	8 3%	WM. PENN	
-FRI 2	PITT	ATL	EA 493				
D.P.	PBS	+ Po	nofoxt	0 R.	Kra	8.50 77102	4 FRETHUST  FROM BONG
Please		<b></b>	6			TOLS009994	Specifor Poloce-)

To Then	
Date	Time/
WHILE YOU	WERE OUT
M Neil Hal	lles
01_ jine Cle	·L
Phone 503-286	- 1611
Telephoned	Please Call
Called To See You	Will Call Again
Wants To See You	Returned Your Call
Message	
61	

K-56 Printed in U.S.A.

31.3

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4285

#OPPERS COMPANY INST. FOREST PRODUCT GRP. SPECIALTY WOOD CHEMICALS SALES BY PRODUCT REPORT SCTOBER, 1932 LOCATION 743 PORTLAND WIC FORM CURRENT MONTH :: 1 THE CUPRENTIYEAR TO DATE QUANTITY SALES AMT PROFIT % P QUANTITY SALES AMT - WOOD TREATING CHEM WOODTOX PRE-PRIME CONC S\_ 55 GAL DR GL 165 850 . 0 WOODTOX PRE-PRIME-T RTU TO EULK GAT 2615 74551 174437 NOODTOX PRE-PRIME-T RTU 55 GAL OR GA 0 3025 1013 WOODTOX PRE-PRIME-T CONC

1224

2750

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55 GAL ER GA

408 LB DR LB

55 GAL DR GA

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PETROSET TT PTLD STOCK - 400 LB CR LB B.415 th Duren

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55 GAL OR GL . KHI D. - 1

-WOOD TREATING CHEM 21.0 PORTLAND WIC FORM TOTALS 276-5

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RIGH

LOCATION 743 PORTLAND WIG FORM

WCCOTOX" T40-T CONC"

TIMBERTOX 40 CONC

WR 340 CONC

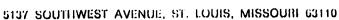
KK-60 SCLVENT

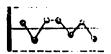
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### WOOD THEATING SHEEMISHES

KOPPERS COMPANY, INC.





	CONFIDENTIAL FORM	ULA RECO	RD		
Product WOODTOX	CONC. T Lab.	Book No. 34=	K. Dale /	April 12	19 %.
Made for St. La	1412, N/62.	CI	nomist	Vills	
POUNDS GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	*
32.5 1.011	Penta	1.5.54	,46	11495	
50.0 6.43.5	Oxobottoms	7.2/	. 2369	,1185	
2.0 1253	Nales Inhibitor	7.4	1,14	.0228	
15.5 2.164	KB-3	7.28	;147	1022785	
1,1,	1,				
					<u> </u>
100,0 11.408		8.77		,313535	
10010 11. 100		14.77	:	11113775	L
REMARKS;	FIT +0 WC . 09494	1	La (	,03	3/gl 57/y
	+ 1+ +0 WC 14 0F475	,		,00	1/1
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•	54. Lows Later 100376	٠.			
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DISTRIBUTION: Sales Dept. . . . . . . Toch. Svc. . . . . . Plant Mgr. . . . . . Plant . . . . . Office Mgr. . . . . . Purch. . . . . . Safe File . . . . . Lab Group . . . . . Other . . . . .



### WOOD TREATING CHEMICALS DEPT.

**₩** 

KOPPERS COMPANY, INC. 5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110

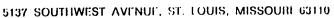
#### **CONFIDENTIAL FORMULA RECORD**

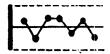
ade for			C	hemist		
OUNDS	GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	%
16.28		1-7 conc.	8.77	4/2231	No.7112	
,74		Wax	7. 5	,428	.003167	
2.98		min Sp.	6.43	. 212	.175917	
		·				
		<del></del>	6.73		,246196	-
TION: ON	IE TO	DILUENT		LBS. 1	<del></del>	<u></u>
ARKS:		Bulk	,			
	RMC	1.657	,	•		
	Blend	, 05	•			
	TIK Los	,0036				
	DH	1,9006				
		[[10]				
		•			LS009998	
	í			TO	L200aaao	•



### WOOD TREATING CHEMICALS DEPT.

KOPPERS COMPANY, INC.





#### CONFIDENTIAL FORMULA RECORD

de for _	_ST.	Louis, Mic.	Ch	emist <u>1</u>	(ulls	
OUNDS	GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	·×
2.5	2.091	Penta	15.54			
0.0	6.455	Oxobottoms	7.2/			
2.0	1253	Nales Inhibitor	7.4		·	<u> </u>
5.5	2,129	KB-3	7.28			<u> </u>
	. ,	•			<del>,</del>	
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010	11.408		8.77			

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DISTRIBUTION: Sales Dept Tech. Svc Purch Safe File Lab G	

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4900 9TH AVENUE N.W., . SEATTLE, WASHINGTON 98107-3697 . 206/783-4700

#### ANALYSIS REPORT

CLIENT: Time Oil Company

DATE REPORTED: 4/18/83

REPORT TO: Neil Wallis

Neil Wallis
P.O. Box 03117

P.O.# 24870

St. Johns Station Portland, OR 97203

Laboratory Sample No.

57057

Client

Identification

Soil 2/28/83

SUBJECT: Static acute fish bioassay testing on juvenile rainbow trout Salmo

gairdneri.

PROCEDURE: Sample was tested at both the 100 and 1000ppm levels. The procedure followed is outlined in the State of Washington's General Procedure

for Static Acute Fish Bioassay Testing.

The test was begun using method two in which the test organisms were placed into the chambers within 30 minutes of adding the toxicant to the water. Daily logs of temperature, dissolved oxygen and mortalities

were maintained.

RESULTS: Thirty (30/30) of the fish tested at the 1000 ppm level died within the first five hours of the four day test period.

Thirty (30/30) of the fish tested at the 100ppm level died within

24 hours of the four day period.

None (0/60) of the control fish died during the four day test period.

CONCLUSION: The soil sample submitted by the Time Oil Company was found to be toxic to juvenile rainbow trout at both the 100 and 1000 ppm hazardous waste

material (E.H.W.) under Washington State Guidelines.

Respectfully Submitted,

Mark A. Fugiel

Director of Industrial Chemistry

### **KOPPERS**

FILE

#### **Interoffice Correspondence**

To	J. D. Palmer	From	D. F. Marion	
Location	St. Louis, MO	Location	K-724/Pittsburgh	
Subject	Union Oil Meeting - 6/9/83	Date	June 13, 1983	

On Thursday, 6/9/83, I met with Pat Geerdes of Union Oil in Seattle to discuss our consignment agreement covering mineral spirits at Time Oil in Portland. Pat requested that we process his invoice from the March shipment since he had not been able to get the agreement from his legal department and he didn't want his credit people getting upset. In order to keep everyone happy, I agreed to process the invoice for payment immediately. I contacted Carol and she was going to forward the invoice to Rosemarie for immediate payment. Pat advised that he would have the consignment agreement mailed to me by next week. The agreement will cover the consignment of 30,000 gallons of mineral spirits at Time Oil in Portland. We will only pay for what we consume each month. In addition, we will arrange to have shipped in tank truck quantities mineral spirits for Union's customers. We will bill Union Oil a charge of \$0.05 per gallon for this loading out service. Currently, our proposed agreement charge from Time Oil is \$0.03 per gallon. In summary, we will only pay for our actual quantity of mineral spirits consumed, while we will be making \$0.02 per gallon on the loading services provided to Union Oil. I expect this consignment agreement will be executed in the next week or so.

If you have any questions regarding the above information or you would like to discuss the Union Oil situation further, please call.

Donald F. Marion

DFM/ctj

cc: P. A. Goydan G. B. Mills

61

K-5 REV 2

Mr. J. Patrick Geerdes Area Manager Union Chemicals Division Petrochemical Group Union Oil Company of California 2000 E. Columbia Way, Bldg. 8 Vancouver, WA 98661

#### Dear Pat:

I would like to take this opportunity on behalf of both Koppers Company and myself to thank you for meeting me at the Red Lion Hotel in Seattle on Thursday, June 9. I thoroughly enjoyed meeting with you and discussing the upcoming Consignment Agreement for mineral spirits at Time Oil Company in Portland. I believe this Agreement will be mutually beneficial to both Koppers Company, Inc. and Union Oil Company. I look forward to receiving the Agreement in Pittsburgh for review and execution in the next couple of weeks.

Again, my sincere thanks for meeting with me in Seattle. I look forward to a successful year in 1983 for both of our fine companies.

Sincerely yours,

Donald F. Marion

DFM/dkm

June 14, 1983

FILE

Mr. Neil Wallis Time Oil Company 12005 N. Burgard Street Portland, OR 97203

#### Dear Neil:

I would like to take this opportunity to thank you and Don Schwendiman for meeting me in Seattle at the airport on Thursday, June 9 to discuss the Storage and License Agreement. I feel that all of the non-economic verbage items have been resolved to our mutual satisfaction. I would hope that we can now agree on the minimum storage fee and the per gallon blending fee and have the agreement executed by both parties by June 30, 1983. I would like to get the first 10,000 gallon railcar in motion to you as quickly as possible. Please review your numbers and advise if you need to discuss any remaining items. I am truly looking forward to getting these negotiations behind us.

Again, my sincere thanks to both Don and yourself for meeting me in Seattle. I will be anxiously awaiting your call on the remaining open items.

Sincerely yours,

Donald F. Marion

DFM/dkm

cc: Robert D. Avendroth
Donald L. Schwendiman

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JUL 29 1993  R Marino  M
Those Oil Pre Prime 1-7 Consentrate label 001 7/28/83
POLD- MESSAGE Bell Baldwin & have discussed the suffichel
Le distributed June 1 a Capy of a triving to attacket.
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"Pentackloraphenal in this product, "hyperthermia. Trust
Symptomatically, " ORIGINATORIO NOT WRITE BELOW THIS LIFE TO SIGNED
REPLY 3) The FPL # should be 1/68.
The label should be printed suced 4819. Plusisend
me 6 capies of final printed label. Thinks
Mangan & Marino
10:W Baldwin
We marion
DATE
SEND WHITE AND PINK COPIES WITH CARBONS INTACT, PINK COPY IS RETURNED WITH REPLY.

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### Department of Environmental Quality

522 S.W. FIFTH AVENUE, BOX 1760, PORTLAND, OREGON 97207 PHONE: (503) 229-5696

July 6, 1984

Air. J. Craig McKenzie, General Manager Chem-Security Systems, Inc. Star Route Arlington, Oregon 97812

Re: HW F11e 4.10 #K

Dear Mr. McKenzie:

Condition B(9) of your hazardous waste disposal site license stipulates that Chem-Security Systems must submit a disposal request, and receive approval of the same, for all wastes proposed to be brought to the Arlington site.

We have reviewed Disposal Request No. #D39854, submitted with your June 13, 1984 letter.

#### WASTE SOURCE

Koppers Company, Inc., c/o Time 011 Company 12005 North Burgard Portland, OR 97203

#### MATERIAL(S) REQUESTED FOR DISPOSAL/STORAGE

	Hazard	Process/Operation	For Disposal		
Description	Type	Generating Waste	Now	Annua 1	
1) Pentachlorophenol tank bottoms	Tox1c (T <sub>4</sub> ) U242	Manufacturing of Wood Preservative Solution	0	700-1700 gals. (in drums)	

#### MATERIAL(S) AUTHORIZED FOR DISPOSAL/STORAGE

Same as above

METHOD OF DISPOSAL

Pit solidify, then dispose of solidified waste in Trench 10 by Procedure 4.

Sincerely

61

Luardo D. Chiong
Eduardo G. Chiong
Environmental Engineer
Hazardous Waste Operations
Solid Waste Division

EGC/cb Enclosure

cc: As. Jenny J. Bardue, CSSI, Bellevue, WA

Ms. Joyce Nunley, CSSI, Portland, OR Mr. George Mills, Koppers Company, Inc.

TOLS010005

A. ---

### WOODTREATING CHEMICALS DEPT. KOPPERS COMPANY

#### FINISHED GOODS SUMMARY - PORTLAND, OREGON

FOR MONTH 30 august 1983

SEP 2 : 1983

nutsk paceuchs sack Decade jaams

	CONTAINER SIZE	INV. UNIT	BEGINNING INVENTORY	RECEIVED	USED	ENDING INVENTORY	PHYSICAL INVENTORY	+
WOODTOX 140 RTU	BULK	GLS.	795	0	0	795	795	
WOODTOX 140 RTU	55 GAL	GLS.	8	0	0	0	9	5
WOODTOX PREPRIME RTU	BULK	GLS.	14589	0	275	14314	14265	-49
WOODTOX PREPRIME RTU	55 GAL	GLS,	38	275	275	38	38	
WOODTOX 140 CONC.	BULK	GLS.	82	0	8	82	77	-5
WOODTOX 140 CONC.	55 GAL	GLS.	605	. 0	0	605	605	
WR 340 CONCENTRATE	55 GAL	GLS.	210	0	0	210	210	
TIMBERTOX 40 CONC.	BULK	GLS.	0	0	0	0	0	
TIMBERTOX 40 CONC.	55 GAL	GLS.	42	873	770	145	255	+110
WOODTOX PREPRIME CONC.	55 GAL	GIS.	532	0	275	257	257	
MCCOTOX PREPRIME CONC.	BULK	CIS.	-0-	6	8	0	0	

WOOD TREATING CHEMICALS DEPT. KOPPERS COMBANY

RAW MATERIAL SUPPLY - PORTLAND, OREGON

FOR MONTH TO august 1983

name	CONTAINER SIZE	INV. TINU	BEGINNING INVENTORY	RECEIVED	USED	ENDING INVENTORY	PHYSICAL INVENTORY	+ .
MINERAL SPIRITS - 325	BULK	CLS.	16267	<del>-0-</del>	Ð	16267	16/85	-92
PARAFFIN WAX	11# SLAB	LBS.	2024	0	0	2024	2024	
PENTA	50# BAG	BAGS	246	6	66	180	180	_^
PENTA	BULK	· LBS.						
NALCO	55 GAL	GLS.	9	54	8	63	63	
OXO BOTTOMS	BULK	GLS.	2647	0	- <del>0</del>	2647	2665	+18
SOLVENT KB-3	BULK-	GLS.	2476	-0	664	1812	1827	+15
wk60	55 GAL	GIS .	22	0	0	22	22	•——
	-	,	FINISHED PRODUC	rs summary			,	
ANSTRIK SAGEBRUSH GREEN	55 GAL	DRUMS	5	0	0	5		
P ETROSET .	55 GAL	DRUMS	0	7	$\Theta$	8	ð.	
COLORSEAL	55 GAL	DRUMS	A			•	0	
WOLMAN PRESTAIN	5 GAL	PIS.	-2_	0	8	2	2_	
ISO ALCOHOL	55 GAL	GLS.	8	0	8	8	F	
PHOSPHORIC ACID .	LBS.	LBS.	129	0	0	129	129	

WOOD TREATING CHEMICALS KOPPERS CO., INC.

CONTAINER SUMMARY - PORTLAND, OREGON

FOR MONTH 20 august 1983

NAME .	CONTAINER SIZE	INV. TINU	BEGINNING INVENTORY	RECEIVED	USED	ENDING INVENTORY	PHYSICAL INVENTORY	+	•
/ т. н.	55 GAL	EA	94				65		•
CONDITIONED T. H.	55 GAL	EA							
Ст. н.	30 GAL	EA							$\overline{}$
CONDITIONED T. H.	30 GAL	EA							······································
/ T. H.	5 GAL	EA	·						
7 O. H.	· 5 GAL	EA							
F. STYLE	6X1 GAL -	CASE							<del> </del>
								·	



Continental Technical Services
A facility of The Continental Insurance Companies
2401 Fourth Avenue, Suite 310
Seattle, Washington 98121

September 9, 1983 L 294 77 91 John A. Soderberg Co.

Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Dear Sir:

On July 19, 1983 I visited your business location at 12005 Burgard Street in Portland, Oregon and met with Mr. Neil Wallis, Plant Manager.

A liability tour of the premises was conducted and the following recommendations are being submitted for your consideration and action.

- 83-1: Provide us with a Manufacturer's Data Sheet on the wood preservative product known as Pentachlorophenol.
- 83-2: Install permanent type manifolds and transfer piping for the wood preservative Pentachlorophenol.

Please let me know of your plans for complying with the above recommendations.

If I can be of any further service to you, please don't hesitate to contact me.

Very truly yours,

Sr. Field Representative CONTINENTAL TECHNICAL SERVICES

DP/jw

cc: N. Wallis, Time Oil Co., Portland, OR John A. Soderberg Co., Seattle, WA

LOSS CONTROL IS A DAILY RESPONSIBILITY OF YOUR MANAGEMENT. OUR VISITS ARE INTENDED TO ASSIST YOU, AND ARE NOT TO BE CONSIDERED A SUBSTITUTE FOR YOUR OWN LOSS CONTROL PROGRAM. RECOMMENDATIONS ARE DEVELOPED FROM CONDITIONS OBSERVED AT THE TIME OF OUR VISIT. THEY DO NOT NECESSARILY INCLUDE EVERY POSSIBLE LOSS POTENTIAL, CODE VIOLATION, OR EXCEPTION TO GOOD PRACTICE.

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SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
SAN PEDRO
LOS ANGELES



### Time oil File-TIME OIL COMPANY Potterson.

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

January 16, 1985

Templeton Smith Law Department Koppers Co. Inc. Pittsburg, PA 15129

Dear Mr. Smith:

Per your request, attached is copy of plot plan 1140 showing location at our Northwest terminal where the Department of Environmental Quality sampled the ground within the diked area in which Pentachlorophenol operations were conducted. Sample was a composite of surface, one foot and two foot depths.

It was a pleasure to meet you in St. Louis last week.

Sincerely,

John P. Denham Environmental Manager

Attachment a/s

JPD/ch

TOLS010010

. . . . .

K-64

000631

From the desk of

**DONALD F. MARION** 

رحؤيك Heave make fe or cool anamourace ٠, ١/١٥/85, كمع son or early en letone when when assentations and problem up + the airport. Please and so struct grown assured might. Q'ee que you a Case Monday. e when wayre eff shown.

Lon

A CARLOS SECONOS PERSONAS ESCONOS ESCO

2/6/85 830 AM

For our teteran earlier today. Page 29 is the parta sample of concern first & page 26 is second.

V Z101741018

TOLS010012

BZTO104(e)046845

## BASE/NEUTRAL EXTRACTABLES METHOD 625

#### 

#### PARAMETER

#### PARAMETER

1

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600

BIS(2-CHLOROETHYL) ETHER
1,3-DICHLOROBENZENE
1,4-DICHLOROBENZENE
1,2-DICHLOROBENZENE
HEXACHLOROETHANE
N-NITROSO-DI-N-PROPYLANINE
NITROBENZENE
ISOPHORGNE

BIS(2-CHLOROETHOXY) METHANE
1,2,4-TRICHLOROBENZENE

NAPHTHALENE
HEXACHLOROBUTADIENE
HEXACHLOROCYCLOPENTADIENE
2-CHLORONAPHTHALENE

ACENAPHTHYLENE DIMETHYLPHTHALATE 2,6-DINITROTOLUENE ACENAPHTHENE
2,4-DINITROTOLUENE
FLUORENE
DIETHYLPHTHALATE
N-NITROSODIPHENYLAMINE
4-BRONOPHENYL PHENYL ETHER
HEXACHLOROBENZENE
PHENANTHRENE
ANTHRACENE
DIBUTYL PHTHALATE
FLUORANTHENE
PYRENE
BUTYL BENZYL PHTHALATE

BENZ (A) ANTHRACENE CHRYSENE

BENZ (A) PYRENE

3,3'-DICHLROBENZIDINE BIS(2-ETHYLHEXYL) PHTHALATE

### PESTICIDES/PCB'S METHOD 608

#### 

#### 

#### PARAMETER

#### 

#### PARAMETER

### TOXAPHENE

ALPHA-BHC BETA-BHC LINDANE HEPTACHLOR ALDRIN P.P'-DDE

PCB GROUP 1
OR PCB GROUP 2

PCB GROUP 3 TOTAL PCB

P,P'-DDD F,?'-DDT

PCB GROUP 1 INCLUDES PCB'S 1221, 1232, 1242 AND IS CALCULATED AS 1242.
PCB GROUP 2 INCLUDES PCB'S 1249, 1254 AND IS CALCULATED AS 1254
PCB GROUP 3 INCLUDES PCB'S 1269, 1262
AND IS CALCULATED AS 1263

ACID EXTRACTABLES
METHOD 625
8270

PARAMETER

PARAMETER

PHENOL

1.

2-CHLOROPHENOL 2-NITROPHENOL

2,4-DIMETHYLPHENOL

2,4-DICHLOROPHENOL

4-CHLORO-3-METHYLPHENOL

2,4,4-TRICHLOROPHENOL
2,4-DINITROPHENOL
4-NITROPHENOL
2-METHYL-4,4-DINITROPHENOL
PENTACHLOROPHENOL

TETRACHLOROPHENOLS \*\*

## REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

PESTICIDES
METHOD 625

**PARAMETER** 

PARAMETER

ALPHA-BHC
HEPTACHLOR
ALDRIN
HEPTACHLOR EPOXIDE
ENDOSULFAN I
TRANS-NONACHLOR
P,P'-DDE

DIELDRIN
ENDRIN
ENDOSULFAN II
P,P'-DDD
ENDOSULFAN CYCLIC SULFATE
P,P'-DDT
6AMMA-BHC (LINDANE)

EP Tox Lead

Inaddition to these specific chemicals we will identify and quantitate any other organic that is observed with the extraction / Oc/ms procedure.

Laboratory	No.	84-1020	>
Duboratory	.,,,	0,,020	_

	÷		Program: _	1290			Date Reported: JAN 15 1035 ,
r .		RCRA Site Survey			<del></del>		Report Data To: States Smits
							abdon't rinse; Organic(X) mason jar
	Item No.	Sampling Point Description	*Sample C		(bottle)	#'s	Test Required
		(include time)	Basic	BOD	Organic		
		Composite Sail core (surface + 1' + 2' 1.3')				21020	EP Lead GC/ms - Acids, BN
· (建) (3 - 法 / 数	1	See map for location				,	PcB's
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Laboratory comments

Lt	:GA	The second of th	DEPA			NMENTAL Ç Analysis	UALITY	Laboratory No. 84-1020
	1.13	Site: Time Oil d By: RFG, JLS			<i>Der</i> 84 42 90	· ·		Date Received Lab: DEC 13 MM 1245
・ 大き かっぱ できる かっぱい はい	:	d By: AT 6	- F1	ogram: _	12.40			Date Reported: JAN 15 1985 ,  Report Data To:
* Basic	Comments		in f	ield; Me	tals (Tm	) HNO3 ad	ded in	lab prepare labdcn't rinse; Organic(X) mason jar
	Item No.	Sampling Point Description (include time)	*		ontainer	(bottle)  Metals  Organia	#'s	Test Required
A CONTRACTOR	7	A CONTROL OF THE CONT					SIOII	EP tox Pb II -GCIMS acid IBN PCB'S
	8						21012	li li
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	11		-				21016	u
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LEGAL

Comments:

DEPARTMENT OF ENVIRONMENTAL QUALITY Laboratory Data Sheet

Laboratory No:	84-1020
Program Code:	4290

Page: \ of: 49

Time	011					·		RFG		Analy	sis Comp	leted: JA	H 0 4 13°5	
Item No.					Test Re	sults	All uni	ts in	mg/l or	ug/m <sup>3</sup> )			,	• • • • • • • • • • • • • • • • • • • •
	bag#	EP Tox Pb												
1	2 1020	20.1												1
<u> </u>	<del>2</del> 1007	<0.1		<u>.</u>										
3	21019	۷٥.۱												
4	21008	20.1												
5	P0015	۷0,۱												
6	21010	<0.1												
7	21011	<0.1												
8	₹1012	<0.1							,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					
۸. ۹	₹1018	<0.1												
10	21017	<0.1				·	:							
11	21016	.<0.1										ļ		
12	21004	<0.1												].
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BZTO104(e)046850

DATE: 31 DEC 84

SAMPLE: Z1929

METHOD 625 EXTRACTED BY RCRA METHOD 3548

******		**********	42523555	
AMOUNT MG/KG	PARAMETER		AMOUNT MG/KG	PARAMETER
<b>12525253</b> ;	:::::::::::::::::::::::::::::::::::::::	=======================================	*******	
· (1	PHENOL		(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL		(1	2,4-DINITROPHENOL
<1	2-NITROPHENOL		(1	4-NITROPHENOL
(1	2,4-DIHETHYLPHENOL	*	(1	2-METHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	•	(1	PENTACHLOROPHENOL
(1	4-CHLORO-3-METHYLPHENOL		<1	TETRACHLOROPHENOL ++
•				64 REPORTED AS
				2,3,4,6-TETRACHLOROPHENOL

#### BASE/NEUTRAL EXTRACTABLES METHOD 625

******							
ANOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER				
******		3525222	***************************************				
(1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE				
⟨1	1,3-DICHLOROBENZENE	(1	2,4-DINITROTOLUENE				
(1	1,4-DICHLOROBENZENE	(1					
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE				
(1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLANINE				
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-8RONOPHENYL PHENYL ETHER				
<1	NITROBENZENE	(1	HETACHLOROBENZENE				
(1	ISOPHORONE	<1	PHENANTHRENE				
(1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE				
(1	1,2,4-TRICHLOROBENZENE	. (1	DIBUTYL PHTHALATE				
1>	NAPHTHALENE	. (1	FLUORANTHENE :				
<1	HEXACHLOROZUTADIENE	(1	PYRENE				
(1	HEXACHLOROCYCLOPENTADIENE .	(1	BUTYL BENZYL PHTHALATE				
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE				
(1	ACENAPHTHYLENE	(1	CHRYSENE .				
(1	DIMETHYLPHTHALATE	. (1	3,3'-DICHLROSENZIDINE				
(1	2,6-DINITROTOLUENE	(I	· ·				
•		(i	BENZ (A) PYRENE				
	•						

## LEGAL

DATE: 31 DEC 84

ME

LAB 1: 48-1929 ITEM 1: 1 SAMPLE: Z1829

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3546

AMOUNT PARAMETER

MG/KG

- (5 ALPHA-BHC
- **45** HEPTACHLOR
- KS ALDRIN
- 45 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- <5 TRANS-NONACHLOR</p>
- (5 P,P'-DDE
- (5 DIELDRIN
- 45 ENDRIN
- CS ENDOSULFAN II
- (5 P,P'-00D
- **K5** ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-DDT
- (5 GAMMA-BHC (LINDANE)

भी

LEGAL

31 DEC 84

GC/MS SCAN ID

B4-1020 71020

THE WATER SAMPLE WAS EXTRACTED BY EFA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE FRIGRITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 62 JAN 84

LAB 8: 84-1926

DH

ITEN #: 2 SAMPLE: Z1867

# LEGAL

# ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3548

ANOUNT MG/KG	PARAMETER	=======	AMOUNT MG/KG	PARAMET <b>er</b>
2222222		223232	********	
1)	PHENOL	سنجو د التيثي	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	÷	(1	2.4-DINITROPHENOL
(1	2-NITROPHENOL		(1	4-NITROPHENOL
(1	2,4-DIMETHYLPHENOL		(1	2-METHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL		(1	PENTACHLOROPHENOL
(1	4-CHLORO-3-METHYLPHENOL		(1	TETRACHLOROPHENOL **

\*\* REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

## BASE/NEUTRAL EXTRACTABLES HETHOD 625

***************************************			
ANOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARANETER
		2222222	
(1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
(1	1,4-DICHLOROBENZENE	(1	FLUORENE
(1	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	· (1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAHINE	(1	4-BROHOPHENYL PHENYL ETHER
(1	NITROBENZENE	(1	HEXACHLOROBENZENE
- (1	ISOPHORONE	₹1	PHENANTHRENE
(1	81S(2-CHLOROETHOXY) METHANE	<b>(1</b>	ANTHRACENE .
(1	1,2,4-TRICHLOROBENZENE	(1	DIBUTYL PHTHALATE
<b>(1</b>	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	. (1	PYRENE
⟨1	HEXACHLOROCYCLOPENTADIENE	. (1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	<1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	. (1	3,3'-DICHLROSENZIDINE
(1	2,6-DINITROTOLUENE	<b>(1</b>	•
		(1	BENZ (A) PYRENE
	•		

6149

LAB #: 84-1929 ITEN #: 2 SAMPLE: 21887

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3546

ANGUNT PARAMETER

- (5 ALPHA-BHC
- KS HEPTACHLOR
- KS ALDRIN
- (5 HEPTACHLOR EPOXIDE
- K5 ENDOSULFAN I
- C5 TRANS-NONACHLOR
- (5 P,P'-DDE
- 45 DIELDRIN
- KS ENDRIN
- K5 ENDOSULFAN II
- (5 P,P'-DDD
- 45 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 GAMMA-BHC (LINDANE)

IKG

Ø2 JAN 85

GC/MS SCAN ID

84-1020 21007

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 28 DEC 84

DH

LAB #: 84-1033 ITEM #: 3 SAMPLE: Z1019

## ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3546

***************************************		***************************************		
AMOUNT	PARAMETER	AMOUNT	PARAMETER	
M6/K6		MG/KG	•	
2222222		72237222	***************************************	
. (1	PHENOL	(1	2,4,6-TRICHLOROPHENOL	
Ω	2-CHLOROPHENOL	⟨1	2,4-DINITROPHENOL	
(1	2-NITROPHENOL	₹1	4-NITROPHENOL	
<1	2,4-DIMETHYLPHENOL	(1	2-METHYL-4, 6-DINITROPHENOL	
(1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL	
(1	4-CHLORO-3-METHYLPHENOL	.(1	TETRACHLOROPHENOL ##	
			** REPORTED AS	
			2,3,4,6-TETRACHLOROPHENOL	

## BASE/NEUTRAL EXTRACTABLES METHOD 625

*======		2222222	
ANOUNT MG/KG	PARAMETER	AHOUNT MG/KG	PARAMETER
222222		******	
a	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	(1	2,4-DINITROTOLUENE
(1	1,4-DICHLOROSENZENE	(1	FLUORENE
<1	1,2-DICHLORGBENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	· (1	N-NITROSODIPHENYLAMINE
7.1	N-NITROSO-DI-N-PROPYLAMINE	₹1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	(1	HEXACHLOROBENZENE
<1	ISOPHORONE	C1	PHENANTHRENE
(1	BIS(2-CHLOROETHOXY) METHANE	(1	ANTHRACENE
<1	1, 2, 4-TRICHLOROBENIENE	. (1	OIBUTYL PHTHALATE
<u>(1</u>	NAPHTHALENE	. (1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
. (1	HEXACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	(1)	BENZ (A) ANTHRACENE
<1	ACENAPHTHYLENE	1)	CHRYSENE
(1	OIMETHYLPHTHALATE	1 (1	3,3°-DICHLROBENZIDINE
(1	2,6-DINITEGTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
		. (1	BENZ (A) PYRENE

DATE: 28 DEC 84

MG

LAB #: 84-1833 ITEM #: 3 SAMPLE: Z1819

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3546

ANOUNT PARAMETER

MG/KG

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- C5 TRANS-NONACHLOR
- (5 P,P'-00E
- (5 DIELDRIN
- CS ENDRIN
- K5 ENDOSULFAN II
- (5 P,P'-DDD
- K5 ENDOSULFAN CYCLIC SULFATE
- . (5 P,P'-DOT

33355

(5 GAMMA-BHC (LINDANE)

HE

28 DEC 84

GC/MS SCAN ID

84-1020 Z1019

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 31 DEC 84



LAB #: 84-1029 ITEN #: 4 SAMPLE: Z1008

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3546

************************************		******	***********************
AHOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
2232222		2222222	
<b>(1</b>	PHENOL	· (1	2,4,6-TRICHLOROPHENOL
<b>(1</b>	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
- (1	2-NITROPHENOL	<b>(1</b>	4-NITROPHENOL
(1	2,4-DIMETHYLPHENOL	<b>(1</b>	2-METHYL-4, &-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	1>	PENTACHLOROPHENOL
(I	4-CHLORO-3-HETHYLPHENOL	(1	TETRACHLOROPHENOL **
,			** REPORTED AS
•		•	2,3,4,6-TETRACHLOROPHENOL

## BASE/NEUTRAL EXTRACTABLES NETHOD 625

2232222			
AHOUNT	PARAMETER	ANGUNT	PARAMETER
MS/KS		MG/KG	
211252:::	***************************************	========	D.
<1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE Services
(1	1,3-DICHLOROBENZENE	1	2,4-DINITROTOLUENE
1)	1,4-DICHLORGBENZENE	<u> </u>	
	•	/1	2.6
(1	1,2-DICHLORGBENZENE	(1)	A Perul Franciscus
(1	HEXACHLORGETHANE	2	N-NITROSOD [PHENYLANINE
<1	N-NITROSO-DI-N-PROPYLAMINE	(1	4-BRONOPHENYL PHENYL ETHER
<1	NITROBENZENE	· (1	HEXACHLOROBENZENE
1	ISOPHORONE	1	PHENANTHRENE
<1	BIS(2-CHLORGETHOXY) METHANE	1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
a	HEXACHLOROCYCLOPENTADIENE	α.	BUTYL BENZYL PHTHALATE
a	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	(1	CHRYSENE
(1	DIMETHYLPHTHALATE	(1	3,3'-DICHLROBENZIDINE .
			·
(1	2,6-DINITROTOLUENE	(1	BIS(2-ETHYLHEIYL) PHTHALATE
		<1	BENI (A) PYRENE

,21·1ª

DATE: 31 DEC 84

MEG

LAB #: 84-1026 ITEN #: 4 SAMPLE: I1608

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3546

ANOUNT PARAMETER NG/KG

- (5 ALPHA-BHC
- **45** HEPTACHLOR
- **45 ALDRIN**
- C5 HEPTACHLOR EPOXIDE
- CS ENDOSULFAN I
- C5 TRANS-NONACHLOR
- (5 P,P'-DDE
- CS DIELDRIN
- CS ENDRIN
- K5 ENDOSULFAN II
- (5 P,P'-DDD
- K5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-DDT
- (5 GAMMA-BHC (LINDANE)

HE

31 DEC 84

#### GC/MS SCAN ID

84-1020 71008

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	,	MG/KG
NONANE		1
DECANE	•	4
4-METHYLDECANE	•	. 3
UNDECANE		, 1 <b>9</b>
2-METHYLUNDECANE		8
DODECANE	•	46
TRIDECANE		67
7-METHYLTRIDECANE		38
HENEICOSANE	•	37

DATE: 28 DEC 84

ME

LAB #: 84-1928 ITEM #: 5 SAMPLE: 21089

# ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3546

***************************************		 2222222	
ANOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
2222222	************************	=======================================	
(1	PHENOL	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	⟨1	4-NITROPHENOL
(1	2,4-DIMETHYLPHENOL	<b>(1</b> )	2-METHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
(1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **
			** REPORTED AS
			2,3,4,6-TETRACHLOROPHENOL

## BASE/NEUTRAL EXTRACTABLES METHOD 625

******		<b>3211111</b>	
ANOUNT	PARAMETER	AMOUNT	PARAMETER
M6/KG		MG/KB	
********		========	
<b>(1</b>	BIS(2-CHLOROETHYL) ETHER	⟨1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	(1	2,4-DINITROTOLUENE
⟨1	1,4-DICHLOROBENZENE	<1	FI UORENE
(1	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLANINE
(1	N-NITROSO-DI-N-PROPYLAMINE	(1	4-BROMOPHENYL PHENYL ETHER
<b>(1</b>	NITROBENZENE	(1	HEXACHLOROBENZENE .
(1	ISOPHORONE	<1	PHENANTHRENE
(1	BIS(2-CHLOROETHOXY) METHANE	(1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	. (1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
(1	HEIACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	<1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	<1	CHRYSENE
⟨1	DINETHYLPHTHALATE	(1	3,3'-DICHLROBENZIDINE
(1	2,6-DINITROTOLUENE	(4	BIS(2-ETHYLHEXYL) PHTHALATE
	•	. (1	BENZ (A) PYRENE

DATE: 28 DEC 84

MG

LAB #: 84-1033 ITEM #:5 SAMPLE: Z1009

PESTICIDES
METHOD 625.
EITRACTED BY RCRA 3548

ANOUNT PARAMETER
MG/KG

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-NONACHLOR
- (5 P,P'-DDE
- (5 DIELDRIN
- CS ENDRIN
- (5 ENDOSULFAN II
- (5 P,P'-000
- K5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 SAMMA-BHC (LINDANE)

Egy

16/19

28 DEC 84

GC/MS SCAN- ID

84-1020 Z1009

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

17/49

DATE: 28 DEC 84

MA

LAB #: 84-1833 ITEN #: 6 SANPLE: Z1818

# ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3546

*****	***************************************	Z2222222	
ANOUNT	PARAMETER	ANGUNT	PARAMETER
ME/KG		K6/K6	
2222222		*******	
(1	PHENOL	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
<b>(1</b>	2-NITROPHENOL	(1	4-NITROPHENOL
(1	2,4-DIMETHYLPHENOL	(1	2-METHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
<1	4-CHLORG-3-METHYLPHENOL	<1	TETRACHLOROPHENOL ++
/		•	** REPORTED AS
	•	•	2,3,4,6-TETRACHLORGPHENOL

### BASE/NEUTRAL EXTRACTABLES METHOD 625

::::::::		*******		* - 4 * - 4
AMOUNT MG/KG	PARAMETER	ANOUNT NG/KS	PARAMETER	
======		3222222		Z:2
<b>(1</b>	BIS(2-CHLOROETHYL) ETHER	<b>〈1</b>	ACENAPHTHENE	
(1	1,3-DICHLOROBENZENE	(1	2,4-DINITROTOLUENE	
<1	1,4-DICHLORGBENZENE	• (1	FLUORENE	
<1	1,2-DICHLOROSENZENE	⟨1	DIETHYLPHTHALATE	
<1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE	
. (1	N-NITROSO-DI-N-PROPYLAMINE	(1	4-BRONOPHENYL PHENYL ETMER	
<1	NITROBENZENE	⟨1	HEXACHLOROBENZENE	•
<1	ISOPHORONE	. (1	PHENANTHRENE	
<1	BIS(2-CHLOROETHOXY) METHANE	₹1	ANTHRACENE	
<1	1,2,4-TRICHLOROBENZENE	. <1	DIBUTYL PHTHALATE	
<1	NAPHTHALENE	⟨1	FLUORANTHENE	
<1	HE LACHLOROBUTADIENE	(1	PYRENE	
<1	HEXACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE	
<b>(1</b>	2-CHLORONAPHTHALENE	17	BENZ (A) ANTHRACENE	TOLS010033
(1	ACENAPHTHYLENE'	(1	CHRYSENE	
(1	DIMETHYLPHTHALATE	. (1	3,3'-DICHLROBENZIDINE	
a	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE	•
		a	BENZ (A) PYRENE	

8/49

DATE: 28 DEC 84

LAB #: 84-1833 ITEM #: 6 SAMPLE: Z1818

PESTICIDES
METHOD 625
EITRACTED BY RCRA 354#

ANOUNT PARAMETER NG/KG

- <5 ALPHA-8HC
- **K5** HEPTACHLOR
- (5 ALDRIN
- <5 HEPTACHLOR EPOXIDE
- KS ENDOSULFAN I
- K5 TRANS-NONACHLOR
- (5 P,P'-DDE
- 45 DIELDRIN
- K5 ENDRIN
- K5 ENDOSULFAN II
- <5 P,P'-000
- K5 ENDOSULFAN CYCLIC SULFATE
- <5 P,P'-DDT
- (5 GAMMA-BHC (LINDANE)

DI

28 DEC 84

SC/MS SCAN ID

84-1020 Z1010

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

Date: #3 Jan 85

241

LAB 4: 84-1929 ITEM 4: 7 SAMPLE: Z1911 20/49

# ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3548

3222233	=======================================	2222222	
ANOUNT	PARAMETER	AMOUNT	PARAMETER
MS/KS		N6/K6	
***************************************		1222233	***************************************
⟨1	PHENOL	. (1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENGL	(1	2,4-DINITROPHENOL
<b>(1</b>	2-NITROPHENOL	(1	4-NITROPHENOL
(1	2,4-DIMETHYLPHENOL	<1	2-HETHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
⟨1	4-CHLORO-3-HETHYLPHENOL	(1	TETRACHLOROPHENOL ++
			## REPORTED AS 2.3.4.6-TETRACHLOROPHENOL

## BASE/NEUTRAL EXTRACTABLES METHOD 625

3432		2222222	***************************************
AMOUNT	PARAMETER	AMOUNT	PARAMETER
M6/K6		MG/KG	
=======		2222222	
(I	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
(1	1,4-DICHLOROBENZENE	(1	FLUORENE
⟨1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
a	HEXACHLOROETHANE	₹1	N-NITROSODIPHENYLAMINE
(1	N-NITROSO-DI-N-PROPYLAMINE	(1	4-BROMOPHENYL PHENYL ETHER
⟨1	NITROBENZENE	<1	HEXACHLORGBENZENE
(1	ISOPHORONE	<b>(1</b>	PHENANTHRENE
.(1	BIS(2-CHLOROETHOXY) METHANE	· <1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	. (1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	<1	FLUORANTHENE
. (1	HEXACHLORGBUTADIENE	(1	PYRENE
(1	HEXACHLOROCYCLOPENTADIENE	<b>(1</b> )	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
· (1	ACENAPHTHYLENE	· (1	CHRYSENE .
(1	DIMETHYLPHTHALATE	₹1	3,3'-DICHLROBENZIDINE
(1	2,6-DINITROTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
		(1	BENZ (A) PYRENE

21/49

DATE: 83 JAN 85

DIII

LAB #: 84-1020 ITEM #: 7 SAMPLE: Z1011

PESTICIDES
METHOD 625
EITRACTED BY RCRA 3549

AMOUNT PARAMETER MG/KG

- (5 ALPHA-BHC
- KS HEPTACHLOR
- 45 ALDRIN
- K5 HEPTACHLOR EPOXIDE
- K5 ENDOSULFAN I
- K5 TRANS-NONACHLOR
- (5 P,P'-DDE
- (5 DIELDRIN
- KS ENDRIN
- C5 ENDOSULFAN II
- (5 P,P'-DDD
- K5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 GAMMA-BHC (LINDAME)

byll

Ø3 JAN 85

GC/MS SCAN ID

84-1020 71011

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: #3 JAN 85

MG

LEGAL

23/49

LAB #: 84-1#2# ITEN #: 8 SANPLE: 21812

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3546

822233333333333333333333333333333333333		2222222	228323222222222222222222222222222222222	
AMOUNT	PARAMETER	AMOUNT	PARAMETER	
N6/K6	•	MG/KG	•	
*******		2222222		
<b>(1</b>	PHENOL	(1	2,4,6-TRICHLOROPHENOL	
(1	2-CHLOROPHENOL	⟨1	2,4-DINITROPHENOL	
′ <1	2-NITROPHENOL	(1	4-NITROPHENOL	
(1	2,4-DINETHYLPHENOL	(1	2-METHYL-4, 6-DINITROPHENOL	
(1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL	
<1	4-CHLORO-3-METHYLPHENOL	<b>(1</b>	TETRACHLOROPHENOL ##	
	, • •		** REPORTED AS 2 % A A-TETRACHI OROPHENON	

### BASE/NEUTRAL EXTRACTABLES METHOD 625

ANCUNT	PARAMETER	AMOUNT	PARAMETER
M6/K6	•	M6/K6	· · · · · · · · · · · · · · · · · · ·
<b>=====</b> :		2222222	المناس
(1	BIS(2-CHLORGETHYL) ETHER	<b>(1</b>	ACENAPHTHENE : Surphine or of the second of
(1	1,3-DICHLOROSENZENE	(1	2.4-DINITROTOLUENE pergusus Desire
(1	1,4-DICHLOROBENZENE	13	FLUORENE Description of sugary
(1	1,2-DICHLOROBENZENE	. (1	DIETHYLPHTHALATE
(I	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
⟨1	N-NITRGSO-DI-N-PROPYLAMINE	(1	4-BROMOPHENYL PHENYL ETHER
₹1	NITROBENZENE	(1	HEXACHLOROBENZENE
<1	ISOPHORONS	14	PHENANTHRENE
(1	BIS(2-CHLOROETHOXY) METHANE	195	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	त	DIBUTYL PHTHALATE
(1	NAPHTHALENE	(1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	. (1	PYRENE
(1	HEXACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	. (1	BENZ (A) ANTHRACENE
1 (1	ACENAPHTHYLENE	15	CHRYSENE
<1	DIMETHYLPHTHALATE	(1)	3,3°-DICHLROBENZIDINE
(1)	2,6-DINITROTOLUENE	$\mathbf{G}^{-}$	BIS(2-ETHYLHEXYL) PHTHALATE
		- (1	BENZ (A) PYRENE

LAB 4: 84-1828 ITEM #: SAMPLE: Z1812

> PESTICIDES NETHOD 625 EXTRACTED BY RCRA 3540

AHOUNT

PARAMETER

- (5 ALPHA-BHC
- ⟨5 HEPTACHLOR
- ⟨5 ALDRIN
- HEPTACHLOR EPOXIDE **<5**
- (5 ENDOSULFAN I
- TRANS-NONACHLOR (5
- **(5**
- P,P'-00E DIELDRIN **(5**
- (5 ENDRIN
- **(5** ENDOSULFAN II
- (5 P,P'-000
- ⟨5 ENDOSULFAN CYCLIC SULFATE
- ⟨5 P,P'-00T
- GAMMA-BHC (LINDANE)

25/49

DH

Ø3 JAN 85

GC/MS SCAN ID

84-1Ø2Ø Z1Ø12

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

26/49

DATE: #3 JAN 85

ME

LAB #: 84-1020 ITEM #: 9 SAMPLE: Z1018

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3548

	******	*********************	:::::::::::::::::::::::::::::::::::::::	******	***************************************	=======================================	الميمل معمد
	ANOUNT MG/KG	PARAMETER	e de la companya de La companya de la co	ANOUNT NG/KG	PARAMETER	•.	ger with the
. :	######################################		:::::::::::::::::::::::::::::::::::::::	3222222	***************************************	العرب	كوا معيد الم
•	<1	PHENOL		(1	2,4,6-TRICHLOROPHENOL	100 89	للسار والمعارف
	<1	2-CHLOROPHENOL		(1	2,4-DINITROPHENOL	The Lea	( · )
	(1	2-NITROPHENOL		(1	4-NITROPHENOL	A / 1	المري
	<b>〈1</b>	2,4-DIMETHYLPHENOL		<u> </u>	2-METHYL-4, 6-DINITROPHE	ENOL / P	]
	<1	2,4-DICHLOROPHENOL		515	PENTACHLOROPHENOL		
	(1	4-CHLORO-3-METHYLPHENOL		12	TETRACHLOROPHENOL **	1 mass of	commercial
	,				** REPORTED AS 2,3,4,6-TETRACHL		to why to for

## BASE/NEUTRAL EXTRACTABLES METHOD 625

	•	•		
21211111		******	:::::::::::::::::::::::::::::::::::::::	
AHOUNT	PARAMETER	AMOUNT	PARAMETER	
M6/K6		M6/K6		
*******	***************************************	\$2\$2222		23:32:2
<1	BIS(2-CHLORGETHYL) ETHER	(1	ACENAPHTHENE	
. (1	1,3-DICHLOROBENZENE	₹1	2,4-DINITROTOLUENE	
1>	1,4-DICHLOROBENZENE	(1	FLUORENE	
(1	1,2-DICHLOROBENZENE	⟨1	DIETHYLPHTHALATE	
· (1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE	
⟨1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHE	R
(1	NITROBENZENE	(1	HEXACHLOROBENZENE	
(1	ISOPHORONE	(1	PHENANTHRENE	
(1	BIS(2-CHLORGETHOXY) METHANE	. (1	ANTHRACENE	-01.004.004.0
(I	1.2.4-TRICHLOROBENZENE	<b>〈1</b>	DIBUTYL PHTHALATE	TOLS010042
(i	NAPHTHALENE	a	FLUORANTHENE	
(I	HEXACHLOROBUTADIENE	(1	PYRENE	ne
(1	HEXACHLOROCYCLOPENTADIENE	· (1	BUTYL BENZYL PHTHALATE	فيتم والمستخمس
(1	2-CHLORGNAPHTHALENE	(1	BENZ (A) ANTHRACENE	is a second of
ä	ACENAPHTHYLENE	1	CHRYSENE	Jens, base, fre
(1	DIMETHYLPHTHALATE	(1	3,3'-DICHLROBENZIDINE	2 Por
ä	2.6-DINITROTOLUENE	/ 1	BIS(2-ETHYLHEXYL) PHTHALA	TE TO THE TENTO
**	Lyo Bininorocochic	-7	DENT/ALDVOCKE	

DATE: 83 JAN 85



LAB #: 84-1626 ITEM #: 9 SAMPLE: 21818

PESTICIDES
NETHOD. 625
EXTRACTED BY RCRA 3546

ANOUNT PARAMETER
MG/KG

- (5 ALPHA-BHC
- **45** HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- KS ENDOSULFAN I
- (5 TRANS-NONACHLOR
- (5 P,P'-00E
- C5 DIELDRIN
- (5 ENDRIN
- K5 ENDOSULFAN II
- (5 P,P'-000
- (5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5. GAMMA-BHC (LINDANE)

#### 28/49

# LEGAL

HKE

Ø3 JAN 85

#### GC/MS SCAN ID

84-1929 71918

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	·	MG/KG
DODECANE		6
TRIDECANE	·	8
PENTADECANE		6

ME

LEGAL

29/49

LAB 1: 84-1829 ITEM 1: 18 SAMPLE: Z1817

ACID EXTRACTABLES
METHOD 625 —
EXTRACTED BY RCRA METHOD 3548

\$		32222222		
ANDUNT	PARAMETER	•	AMOUNT	PARAMETER
MS/KS			MG/KG	
********		2222222222	12321112;	
<b>(1</b>	PHENOL		<b>(1</b>	2,4,6-TRICHLOROPHENOL
1)	2-CHLOROPHENOL		(1	2,4-DINITROPHENOL
<1	2-NITROPHENOL		<1	4-NITROPHENOL
(1	2,4-DIMETHYLPHENOL		4	2-METHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL		1829	PENTACHLOROPHENOL
(1	4-CHLORO-3-HETHYLPHENOL		71	TETRACHLOROPHENOL **
				** REPORTED AS

2,3,4,6-TETRACHLOROPHENOL

## BASE/NEUTRAL EXTRACTABLES METHOD 625

AMGUNT	PARANETER	AMOUNT	PARAMETER
N6/K6	I GIVOUR LEA	M6/K6	Innicia
********		2222222	
(1	BIS(2-CHLORGETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	1>	2,4-DINITROTOLUENE
(1	1,4-DICHLORGBENZENE	<b>(1</b>	FLUORENE
<1	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
⟨1	HEXACHLORGETHANE	<1	N-NITROSODIPHENYLAMINE
₹1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
(1	NITROBENIENE	(1	HEXACHLOROBENZENE
(1	ISOPHORONE	(1	PHENANTHRENE
(1	BIS(2-CHLORGETHOXY) METHANE	(1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	(1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLGROBUTAD IENE	(1	PYRENE
(1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
<1	ACENAPHTHYLENE	(1	CHRYSENE
(1	DINETHYLPHTHALATE	(1	3,3'-DICHLROBENZIDINE
(1	2,6-DINITROTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
		(1	BENZ (A) PYRENE

LEGA

DATE: 03 JAN 85

LAB 1: 84-1626 ITEM #: 19 SAMPLE: ZIØ17

> PESTICIDES METHOD 625 EXTRACTED BY RCRA 3549

ANDUNT

**PARAMETER** 

- ALPHA-9HC **<5**
- **<5** HEPTACHLOR
- (5 ALDRIN
- HEPTACHLOR EPOXIDE ⟨5
- ⟨5 ENDOSULFAN I
- **<5** TRANS-NONACHLOR
- ₹5 P,P'-00E
- ⟨5 DIELDRIN
- ₹5 ENDRIN
- ⟨5 ENDOSULFAN II
- P,P'-000 ⟨5
- ENDOSULFAN CYCLIC SULFATE ⟨5
- P,P'-00T
- GAMMA-BHC (LINDANE)

ME

Ø3 JAN 85

#### GC/MS SCAN ID

#### 84-1020 21017

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
1-ETHYL-4-METHYLCYCLOHEXANE	10
2,6-DIMETHYLOCTANE	10
4-METHYLNONANE	8
1-METHYL-4-(1-METHYLETHYL)CYCLOHEXANE	. 12
4-METHYLDECANE	36
BUTYLCYCLOHEXANE	14
5-METHYLDECANE	15
3-METHYLDECANE	. 8
UNDECANE	18
OCTYLCYCLOPROPANE '	53

THE SAMPLE ALSO CONTAINED NUMEROUS OTHER COMPOUNDS NOT IDENTIFIED. THE PATTERN, HOWEVER, WAS INDICATIVE OF A SOLVENT MIXTURE SIMILAR TO PAINT THINNER.

LAB #: 84-1829

ME

LEGAL

32/49

ITEM #: 11 SAMPLE: 21816

# ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3548

***************************************		*******	***************************************
AMOUNT MG/KG	PARAMETER	AHOUNT HG/KG	PARAMETER
***************************************		1221212	************************************
<1	PHENOL	α	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
<b>(1</b>	2-NITROPHENOL	(1	4-NITROPHENOL
⟨1	2.4-DIMETHYLPHENOL	(1	2-METHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
(1	4-CHLORO-3-METHYLPHENOL	(1	TETRACHLOROPHENOL **
			** REPORTED AS
	•		2,3,4,6-TETRACHLOROPHENOL

## BASE/NEUTRAL EXTRACTABLES METHOD 625

(1 (1	BIS(2-CHLOROETHYL) ETHER 1,3-DICHLOROBENZENE 1,4-DICHLOROBENZENE	MG/K6 . ======= (1 (1	ACENAPHTHENE
(1 (1	1,3-DICHLORGBENZENE		
(1	·	<:	
(1	·		2,4-DINITROTOLUENE
/1		<1	FLUORENE
</td <td>1,2-DICHLOROBENZENE</td> <td><b>(1</b></td> <td>DIETHYLPHTHALATE</td>	1,2-DICHLOROBENZENE	<b>(1</b>	DIETHYLPHTHALATE
(1 1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
(1 )	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
(1	NITROBENZENE	(1	HEXACHLOROBENZENE
(1	ISOPHORONE	<1	PHENANTHRENE
(1	BIS(2-CHLORGETHOXY) METHANE	<1	ANTHRACENE
<b>(1</b>	1,2,4-TRICHLOROBENZENE	₹1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	(1	FLUORANTHENE
(1 )	HEXACHLOROBUTADIENE	<1	PYRENE
(1	HEXACHLOROCYCLGPENTADIENE	₹1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	<1	BENZ (A) ANTHRACENE
1)	ACENAPHTHYLENE	(1	CHRYSENE
<1	DIMETHYLPHTHALATE	(1	3,3'-DICHLROBENZIDINE
<1	2,6-DINITROTOLUENE	<b>⟨1</b> <b>⟨1</b>	BIS(2-ETHYLHEXYL) PHTHALATE BENI(A)PYRENE

DATE: #2 JAN 85

ME

LAB #: 84-1929 ITEN #: 11 SANPLE: Z1816 LEGAL

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3548

ANOUNT PARAMETER

MR/KS

·

- 45 ALPHA-BHC
- KS HEPTACHLOR
- 45 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- KS ENDOSULFAN I
- (5 TRANS-NONACHLOR
- (5 P,P'-DDE
- 45 DIELDRIN
- 45 ENDRIN
- (5 ENDOSULFAN II
  - (5 P,P'-DDD
- C5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 GAMMA-BHC (LINDANE)

34139

Dyl

Ø2 JAN 85

GC/MS SCAN ID

84-1020 Z1016

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 62 JAN 85

LAB #: 84-1020 ITEM #: 12 SAMPLE: 11004 DJH

# ACID EXTRACTABLES THE METHOD 625 EXTRACTED BY RCRA METHOD 3548

***************************************			
ANOUNT	PARAMETER	AMOUNT	PARAMETER
M6/K6	•	M6/K6	•
=======================================	**************************		*******************************
(1	PHENOL	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	· (1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	(1	4-NITROPHENOL
(1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
a	4-CHLORO-3-METHYLPHENOL		TETRACHLOROPHENOL **
	•		** REPORTED AS 2.3.4.6-TETRACHLOROPHENOL

## BASE/NEUTRAL EXTRACTABLES METHOD 625

***************************************		***************************************	
ANOUNT	PARAMETER	AMOUNT	PARAMETER
<b>#8/K8</b>		M6/K6	
<1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	(1	2,4-DINITROTOLUENE
(1	1,4-DICHLOROBENZENE	(1	FLUORENE
(1	1,2-DICHLOROBENZENE	₹1	DIETHYLPHTHALATE
⟨1	HEXACHLOROETHANE	<b>(1</b>	N-NITROSODIPHENYLAMINE
(1	N-NITROSO-DI-N-PROPYLAMINE	(1	4-BROMOPHENYL PHENYL ETHER
(1	NITROBENZENE	<1	HEXACHLOROBENZENE
(1	ISOPHORONE	(1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	(1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	₹1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	<b>(1</b>	FLUORANTHENE
₹1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	⟨1	BUTYL BENZYL PHTHALATE
⟨1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
₹1	ACENAPHTHYLENE	<1	CHRYSENE
⟨1	DINETHYLPHTHALATE	. <1	3,3'-DICHLROBENZIDINE
(1	2.6-DINITROTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
		(1	BENZ (A) PYRENE
		_	

LAB #: 84-1029 ITEN #: 12

SAMPLE: Z1884

PESTICIDES METHOD 625 EXTRACTED BY RCRA 3548

AHOUNT PARAMETER

M6/K6

ALPHA-BHC

- ⟨5
- ⟨5 HEPTACHLOR
- ⟨5 ALDRIN
- **(5** HEPTACHLOR EPOXIDE
- ⟨5 ENDOSULFAN I
- ⟨5 TRANS-NONACHLOR
- P,P'-DDE ⟨5
- **(5** DIELDRIN
- ENDRIN
- ENDOSULFAN II
- P,P'-000
- ENDOSULFAN CYCLIC SULFATE
- P,P'-00T
- SAMMA-BHC (LINDAME)

CAL

87

Ø2 JAN 85

GC/MS SCAN ID

84-1020 21004

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 14 JAN 85

AB 8: 84-1828 PEN 8: 1

ITEN #: 1 SAMPLE: Z1828

> PCB'S METHOD 608

(6.5 PCB GROUP 1 (6.1 PCB GROUP 2 (8.65 PCB GROUP 3 (8.95 PCB GROUP 4 (8.65 PCB GROUP 5

TOTAL PCB

AMOUNT NG/KG

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262
AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

LAB 4: 84-1929

ITEM #: 2

SAMPLE: Z1887



PCB'S METHOD 608

ANOUNT PARAMETER

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262
AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

ITEM #:

SAMPLE: Z1819

PCB'S METHOD 488

AMOUNT PARAMETER PCB EROUP 1 PCB GROUP 2 PCB SROUP 3 (8.95 PCB GROUP 4 PCB GROUP 5 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221. PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232. PCB-GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242. PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254. PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262 AND IS CALCULATED AS 1268.

41/40

DATE: 14 JAN 85

LAB #: 84-1828 (P

ITEN ::

SAMPLE: Z1008

PCB'S

ANOUNT PARAMETER
M6/K6

(6.25 PCB GROUP 1
(6.1 PCB GROUP 2
(6.05 PCB GROUP 3
(6.05 PCB GROUP 4
(6.05 PCB GROUP 5
6 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262
AND IS CALCULATED AS 1269.

42/49

DATE: 14 JAN 85

LAB #: 84-1929

ITEM #:

SAMPLE: Z1889

Dr.

PCB'S METHOD 608

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262
AND IS CALCULATED AS 1260.

43/40

DATE: 14 JAN 85

LAB #: 84-1928 (

ITEN 1:

SAMPLE: Z1918

PCB'S METHOD 688

AMOUNT PARAMETER NG/KG

(8.25 PCB GROUP 1 (8.1 PCB GROUP 2 .89 PCB GROUP 3 (8.05 PCB GROUP 4 (8.05 PCB GROUP 5 .89 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262
AND IS CALCULATED AS 1250.

DATE: 14 JAN 85

LAB 4: 84-1026 ITEM 4: 7 SAMPLE: Z1011

> PCB'S METHOD 608

AMOUNT PARAMETER

MG/KG

(6.25 PCB GROUP 1

(6.1 PCB GROUP 2

(6.65 PCB GROUP 3

(6.65 PCB GROUP 4

(6.65 PCB GROUP 5

6 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262
AND IS CALCULATED AS 1260.

45/49

DATE: 14 JAN 85

LAB #: 84-1929 ITEN #: 8

ITEM #: 8
SAMPLE: ZI#12

PCB'S METHOD 608

AMOUNT PARAMETER
MG/KG

<0.75 PCB GROUP 1
<0.25 PCB GROUP 2

(8.15 PCB GROUP 3 (8.15 PCB GROUP 4 (8.15 PCB GROUP 5 8 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCR GROUP 5 INCLUDES PCB'S 1250 AND 1262
AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

LAB #: 84-1929

ITEM #:

SAMPLE: Z1918

PCB'S METHOD 688

**AMOUNT PARAMETER** 

- (19 PCB GROUP 1
- (18 PCB GROUP 2
- **<5** PCB GROUP 3
- (5 PCB GROUP 4
- PCB GROUP 5
- TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1816, 1242, AND 1248 AND IS CALCULATED AS 1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1248 AND 1262 AND IS CALCULATED AS 1260.

47/49

DATE: 14 JAN 85

LAB #: 84-1625 ITEN #: 18 SAMPLE: Z1517

P&Y

(58

PCB'S METHOD 608

AMOUNT PARAMETER

MG/KG

(188 PCB GROUP 1

(199 PCB GROUP 2

(58 PCB GROUP 3

(59 PCB GROUP 4

PCB GROUP 5 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

LAB #: 84-192# ITEM #: 11

SAMPLE: Z1916



PCB'S METHOD 648

AHOUNT PARAMETER
MG/KG

(8.25 PCB GROUP 1
(8.1 PCB GROUP 2
(8.85 PCB GROUP 3
(8.95 PCB GROUP 4
(8.85 PCB GROUP 5
8 TOTAL PCB

PCB GROUP I INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262
AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

LAB #: 84-1020 ITEM #: 12 SAMPLE: Z1004



PCB'S METHOD 688

######################################	:===:	:::::::		::::::	:=====	*****	=======
AMOUNT MG/KG		PARAM	ETER				
33223333	:===:		::::::	::::::	:====:	:23222	=======
(8.5	PCB	6ROUP	1				
⟨\$.1	PCB	GROUP	2				
(8.95	PCB	GROUP	3				
(9.95	PCB	GROUP	4				•
(9.95	PC8	<b>GROUP</b>	5				
8	TOT	AL PCB					

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262
AND IS CALCULATED AS 1260.

### Marsh & McLennan

Marsh & McLennan, Incorporated Marsh & McLennan Building 720 Olive Way Seattle, Washington 98101 Telephone (206) 223-1240

March 5, 1985

Time Oil Company 2737 West Commodore Way Seattle, Washington 98199

Attention: John Denham

Attn Mr. Steve Skeel

Attention: John Dennam					
Insured Northwest Vacuum Truck Service, Inc.					
Company and Policy No. Safeco					
Various - See attached					
certificate  Coverage					
Location Post Office Box 24402					
Seattle, Washington 98124					
( ) Policy enclosed					
(XX) Certificate xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx					
( ) Premium invoice enclosed for					
) Premium invoice will be mailed to you by the Insuror					
( ) Mortgage or Loss Payable clause enclosed					
( ) Contract of Sale clause enclosed					
( ) Please return for cancellation, Policy No.					
( )					
Sincerely yours,					
MARSH & McLENNAN, INCORPORATED					
Fackie Start					
Jackie Starr					
Account Representative Enclosures					
mf cc: Northwest Vacuum Truck Sonvice Inc					

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### **Saif** CORPORATION

INSURING COMPANY:

- ☐ SAIF CORPORATION
- ☐ SAIF CORPORATION OF OREGON

### Certificate of Coverage

Date of Issue: FEBRUARY 25, 1985

TO: TIME OIL CO,

2737 W. COMMODORE WAY SEATTLE, WASHINGTON 98199

ATTN: JOHN DENHAM

Michael J. Dora

Michael J. Dora Director Underwriting Division

TOLS010067

BZTO104(e)046900

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MARSH & MCLENNAN, INCORPORATED MARSH & MCLENNAN BUILDING		News A SAFEO					
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(206) 223-1240		TIPANY C	<u> </u>				
NORTHWEST VACUUM TRUCK POST OFFICE BOX 24402	-	1000					
SEATTLE, WASHINGTON 98	124	PARTY 5					
This is to certify that policies of insurance listed any contract or other document with respect	ect to which this certificate may be is:						
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GENERAL LIABILITY			EDDILY NUMBY	RRITE I	· •		
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WORKERS' COMPENSATION			STATUTORY				
EMPLOYERS' LIABILITY OTHER				\$	FASH A TODENT		
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	As respect	s the operations of	the Insured.				
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mun such nerro	e shak imbose no dolization		thuscompany. NT EXECUTIVE:	Jo Ann C	Crook		
Time Oil Com			March 5, 19				
2737 West Co	ommodore Way Shington 98199	MARSH	MCLENNAN, INCO	RPORATED	L L		
	ion: John Denham	By:	John C.	Ya	7		

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CONTRACT DOND			_	н 34156
CONTRACT BOND		NC	e DRTHWEST VACUUM TRU	ond No
5555 NORTH CH	SE PRESENTS, Thai ANNEL - BLDG.	t we, 43 - PORTI	AND. OREGON 97217	-
called the Principal, and	HERITAGE INSUR OF AMERICA,	ANCE COMPA	NY A ILLINOIS	H 34156  ond No
bound untoTIME (	on co.			
•				
called the owner in the sum	of FIFTY THR	EE THOUSAN	ID AND NO/100THS -	~~~~~~~~~~~~~~~
			Do	ilars (\$ 53,000.00** )
for the payment whereof sa	id Principal and Sure	ty bind thems	elves firmly by these preser	its.
WHEREAS, the Principal hawith the Owner for REA	as, by written Agreen MOVAL OF EARTH	nent, dated EN MATERIA	MARCH 12, L OWNED BY OWNER F	_, 19_ <u>85</u> , entered into a Contract ROM_TTS_PRESENT
LOCATION, LOAD IT	INTO SUITABLE	TRANSPORT	ATION VEHICLES AND	TRANSPORT IT TO A
DISPOSAL FACILITY A	APPROVED BY THI	E OREGON D	EPARIMENT OF ENVIR	ONMENTAL OUALITY.
				<u> </u>
a copy of which is by refere	ence made a part here	eof;	<del></del>	
NOW, THEREFORE, THE Contract, and indemnify an lien arising out of claim for	CONDITION OF THE d save harmless the C r labor or materials t	HIS OBLIGAT Owner from all utilized in the	loss, cost or damage which	Principal shall faithfully perform the Owner may suffer by reason of(any ontract, then this obligation shall be
NOW, THEREFORE, THE Contract, and indemnify an lien arising out of claim for void; otherwise to remain in	CONDITION OF THE d save harmless the C r labor or materials t	HIS OBLIGAT Owner from all utilized in the	loss, cost or damage which	Owner may suffer by reason oftany ontract, then this obligation shall be
NOW, THEREFORE, THE Contract, and indemnify an lien arising out of claim for	CONDITION OF THE d save harmless the C r labor or materials to the full force and effect	HIS OBLIGAT Dwner from all utilized in the	loss, cost or damage which construction under said C	Owner may suffer by reason oftany ontract, then this obligation shall be
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#### HERITAGE INSURANCE COMPANY OF AMERICA

LINCOLNWOOD, ILLINOIS

NORTHWEST VACUUM TRUCK SERVICE, INC.

#### Power of Attorney

AMOUNT OF BOND \$ 53,000.00

ITUTO CONTRACTOR OF THE PROPERTY OF THE PROPER	
	itage Insurance Company, a Corporation in the State of Illinois, having its
Trincipal office in Lincolnwood, Illinois, pursuant to the following the 9th day of March, 1979, to wit:	ing resolution, adopted by the Board of Directors of the said Company on
44. 11. 11. 11. 11. 11. 11. 11. 11. 11.	designated by the Board of Executive Committee shall have authority,
severally, to make, execute and deliver a power of attorney co	instituting as Attorney-in-Fact such persons, firms or corporations as such
officers may select from time to time."	in may ninged 2 matrices and in which the first flags in 2 mail 2 mail - Since and in was a set of the first the since a series and a series and a series and a series and a set of t - Since and a series and a
does hereby make, constitute and appoint J.T. Kohoutek, C.J.	. Huffman and/or J.C. Baumann of Seattle in the State of Washington, its ority hereby conferred in its name, place and stead, to sign, execute, ac-
the and lawful attorney(s) in lact, with full power and additionally and its act and deed, as follower in its behalf, and its act and deed, as follower.	Onty hereby contented in its name, page and stead, to sign, execute, ac-
The obligation of the Company shall not exceed the sum of	그 그 가게 하시다 하는 사람들은 사람들은 그가 살아 그는 것은 것은 것으로 들었다.
The congation of the Company shan not exceed the sum of	Tive number thousand (\$300,000.00) dollars.
	to the same extent as if such bond or undertaking was signed by the duly
suthorized officers of the Heritage Insurance Company, and al hereby ratified and confirmed.	I the acts of said Attorney(s) pursuant to the authority herein given, are
	vany has caused these presents to be signed by its President and/or its
Vice-President, and its Corporate Seal to be hereto affixed.	any mas camed these presents to be signed by its riendent and of its
<u>ใส้ยสุขสยสน์สอบการย์งายการ เล่น (1977) เก็บ (1</u>	
กับกับกับกับกับกับกับกับกับกับกับกับกับ	HERITAGE INSURANCE COMPANY OF AMERICA
	Timenty Leaving
All Marie Control of the Control of	Vincent M. Giacinto, President
and his house the second secon	តំបានប្រជាពលរដ្ឋបានប្រជាពលរដ្ឋបានប្រជាពលរដ្ឋបានប្រជាពលរដ្ឋបានប្រជាពលរដ្ឋបានប្រជាពលរដ្ឋបានប្រជាពលរដ្ឋបានប្រជាពល
State of Illinois ) County of Cook ) SS:	
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Ditail On this 9th day of March, 1979, before the subscriber	, a Notary Public of the State of Illinois in and for the County of Cook
duly commissioned and qualified, came V. M. Giacinto of the	Heritage Insurance Company, to me personally known to be the individual nstrument, and acknowledged the execution of the same, and being by me
ightharpooled and said, that he is the officer of said Co	ompany aforesaid, and that the seal affixed to the preceding instrument is
the Corporate Seal of said Company, and the said Corporate S	eal and signature as an officer were duly affixed and subscribed to the said
Instrument by the authority and direction of the said Corpora instrument, is now in force.	tion, and that the resolution of said Company, referred to in the preceding
, <del>-</del>	and, and affixed my official seal at Lincolnwood, Illinois, the day and year
siabove written	me, and driving my original and at Supporting and among an any and
<u>មកម្មក្រុម ប្រជាព្រះជាមកម្មការការការការការការការការការការការការការក</u>	
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	Notary Produc
	JOSEPH D. UDONI
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	Qualified in State of Blincis
	Commission Expires March 4, 1984
State of Minois ) SS:	را در المراق المراق المراق المراق المراق المراق المراق
County of Cook)	روز ( الأولاد) و المرافق المرا والمرافق والمرافق المرافق المر
allallallallallallallallallallallallall	RTIFICATE
[] I, the undersigned, Secretary of HERITAGE INSURAL	WCE CO. a stock corporation of the State of Illinois, DO HEREBY y and Certificate of Authority remains in full force and has not been
revoked; and furthermore, that the Resolution of the Board	of Directors, as set forth in the Certificate of Authority, are now in
force.	
- Signid and Sealed at the Home Office of the Company	, at Lincolnwood, Illinois. Dated this 12TH day of
MARCH A.D., 19 85	
· · · · · · · · · · · · · · · · · · ·	

### CHEM-SECURITY SYSTEMS, INC.

### DISPOSAL REQUEST

	REFERENCE: E13588
SUBJECT:	
WASTE STREAM NAME: <u>PCP_conteminated_so</u>	il
PHYSICAL STA	
LIQUID - SOLID - S	SEMISOLID U242  EPA WASTE CODE
TOP OF CO.	
GENERATOR NAME: TTME OTL CO.	ORD009597543  EPA GENERATOR I.D. NUMBER
FACILITY ADDRESS	MAILING ADDRESS
•	
Time Oil Co.	
12005 N. Burgard Pd.	
Portland, Or	
GENERATOR CONTACT PERSON NAME: John P. D	enham Tel. No. (206 285-2400
	for disposal at the Chem-Security Arlington site. The complete waste
description is detailed on the attached waste profile sheet and	I is summarized below.
DESCRIPTION	PROCESS/OPERATION
CHEMICAL COMPOSITION	GENERATING WASTE
other chilcrinated chemicals) non-contamin	
WASTE VOLUME REQUESTED FOR DISPOSAL:260	0 cubic vards (
lased on the Waste Characteristics, Chem-Security proposes to Dis	spose of the Waste By (Describe Treatment/Disposal Procedure)
No free liquid allowed.	
.C. CSSI, Arlington, OR	
C.C. CSSI, Bellevue, WA	SUBMITTED BY: J. Craig McKenzie NAME (PRINT)
CSSI, Portland, OR	Com on 1/
Generator	SIGNATURE
•	4-29-85
•	DATE
FOR OREGON DEPARTMENT O	F ENVIRONMENTAL QUALITY USE ONLY
HE SUBJECT WASTE STREAM HAS BEEN REVIEWED FOR	
DISPOSAL AT THE ARLINGTON SITE AND IS HEREBY:	COMMENTS:
	*
State of Oregon	
Department of Environmental Quality	
Or. May 14, 1985 61	
m. May 14 1985 01	
Solid waste Division	
Hazardous Waste Operations	
	T TOLS010071
SSI-6900 (1/85) RE: HW4.10_	
ENCL. 1	•

CEPHASECURITY SY	SEEMIS IN(	DISPOSA	LREQUEST (	RECEIVED MAY.	5) 985
SUBJECT 115		minated soll HYSICAL STATE			
GENERATOR NAME	Liquip III a	SOLID DE SEM		242 EPA WASTE	CODEN A
		LITY ADDRESS		MAILING AD	ORESS
	12005 N. Brogs Fortland, Or		6493		
GENERATOR CONTA	CT PERSON NAME:_	John P. Denha	an an	Tel. No.	206 285-2400
Review and approval of description is detailed o				Security Arlington site. The	complete waste
	DESCRIPTION CHEMICAL COMPO			PROCESS/OPE GENERATING	
Contaminated so other chiarinate				Cloan up	·
WASTE VOLUME REC	UESTED FOR DISPO	SAL: <u>260 വ</u>	<u>abrar vards</u> wow	<b>3</b>	NUAL
Based on the Waste Characte		proposes to Dispose	of the Waste By (Des	cribe Treatment/Disposal P	rocedure)
No firm lamine a	i wed.			*	
C.C. CSSI, Arlington, OR C.C. CSSI, Bellevue, WA CSSI, Portland, OR Generator		*	SUBMITTED BY:	J. Craig Acken	NT)
	FOR OREGON DE	PARTMENT OF EN	 IVIRONMENTAL OU	DATE	4
THE SUBJECT WASTE STR DISPOSAL AT THE ARLIN	EAM HAS BEEN REV GTON SITE AND IS H	IEWED FOR	COMMENTS:		•
Department of Environment of Environ	ital Quality			TOLS010072	
		RE: HW4.10	4.4	<b>等</b>	Janes I

200

	M SECURITY SYSTEMS, INC.		ONAL RESPO	NT RI	ESPONSE CEN Yatin Approved. OM	No. 2000	800-4	2-03 3-7-3 
T	UNIFORM HAZARDOUS WASTE MANIFEST  1. General	ator's US EPA ID No.	Manifest Document No.	2. Pa	ge 1 Informa not requ	ition in the uired by Fe	shaded aderal lav	areas v.
3.	Generator's Name and Mailing Address	<del> </del>	<del></del>	A. St	ate Manifest Docu	ment Num	ber	-
				R Ser	ate Generator's ID	· · · · · · · · · · · · · · · · · · ·		
4.	Generator's Phone ( )			}		, ,	es es	• •
5.	Transporter 1 Company Name	6. US EPA ID Num	ber		ate Transporter's I			-
Ļ.					ansporter's Phone		7 7 ·	
7.	Transporter 2 Company Name	8. US EPA ID Num			ate Transporter's l	<u> </u>		
-	Designated Facility Name and Site Address	10. US EPA ID Num		<del> </del>	ate Facility's ID		<del>`</del>	
, ·	Chem-Security Systems, Inc.	70.		- g g-s				
1	Star Route Arlington, Oregon 97812	ORD 089 452	252		cility's Phone***** 03-454-2643		\$0 J	- <del>M</del>
<b>-</b>	<del></del>		12. Cont	1	13.	14.	EPA/	1 1
<b>,</b> ''	. US DOT Description (Including Proper Shipping Name, Haz [HM]	rarg Class, and ID Number)	No.	Type	Total Quantity	Unit Wt/Vol		l. • No.
a.		<del></del>		-/-	-	1117191	2 2 10	
				]	[			
			<u> </u>		· · · ·	-		<u> </u>
b.							1. Sec. 1.	
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<u> </u>				<u>                                     </u>	<u> </u>	4	<u> </u>	
c.			1	}			12	
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d.	++	<del></del>		<del>                                     </del>	<del> </del>	+		
a.			}	}		1 1	3. 3	
					1	1 1		
J.	Additional Descriptions for Materials Listed Abave			K. Ho	ndling Codes for	Wastes Lis	ted Abov	,
	G. 25		. Y					
	<b>b.</b> 16 - 17 - 17 - 17 - 17 - 17 - 17 - 17 -	· · · · · · · · · · · · · · · · · · ·	•		and the second second			
L	<b>4.</b>			<u> </u>		<del></del>	·	
	. Special Handling Instructions and Additional Information a.	Waste Profile Sheet Number	er(s)					
	b.							
}	C.							
	d.	•						
16	GENERATOR'S CERTIFICATION: I hereby declare that the	contents of this consignment are fully	and accurately	describ	ed above by prop	er ·		
	shipping name and are classified, packed, marked, and according to applicable international and national govern	labeled, and are in all respects in I	proper condition	for tro	ansport by highwo	iy		
	· · · · · · · · · · · · · · · · · · ·						Dat	<u>.                                    </u>
	Printed/Typed Name	Signature				M	onth Day	, Y.
-			<del></del>				<u>:                                    </u>	
17	. Transporter 1 Acknowledgement of Receipt of Materials	· · · · · · · · · · · · · · · · · · ·	<del></del>				Dat	
	Printed/Typed Name	Signature				Me i	onth Day	, Y. I
10	Transport 2 Ashard - decrease ( Transport )					<del></del>	<u>: ا :</u>	
און ו	Transporter 2 Acknowledgement of Receipt of Materials						Dat	•

ORIGINAL-RETURN TO GENERATOR

Signature

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

19. Discrepancy Indication Space

Printed/Typed Name

#### 4.0 MANIFEST REQUIREMENTS

When hazardous waste is transported from the generator's location to the Arlington Facility, the Oregon DEQ, U.S. DOT and EPA require proper manifesting. Beginning September 20, 1984, these agencies required use of a uniform hazardous waste manifest form (Exhibit 7a) and, where necessary, a continuation sheet (Exhibit 7b).

Each load of chemical waste shipped to the Arlington Facility must be accompanied by one or more properly completed uniform manifests. All copies of manifests and continuation sheets must be legible. If manifest forms are needed by the generator, treater or transporter, they can be obtained by contacting the appropriate Chem-Security Systems sales office. When the transporter arrives at the Arlington Facility, the manifest(s) and other shipping paper(s) must be presented to the site receiving clerk for verification.

#### 4.1 WHEN TO USE THE CONTINUATION SHEET

The continuation sheet must be used if:

- o More than two transporters are used to transport the waste, or;
- o More space is required for U.S. DOT description and related information in Section 11 of the manifest.

#### 4.2 GENERATOR SUPPLIED INFORMATION REQUIRED ON MANIFESTS

To meet all the applicable current regulations on manifesting of hazardous waste to the Arlington Facility, and to help us efficiently and speedily handle waste loads, the items described below are needed on a properly completed manifest. A sample completed manifest is shown in Exhibit 7c. States other than Oregon may require other information (see Exhibit 7d).



-13-

Continuation		
Sheet	Manifest	
Section #	Section #	
21	1	Generator's EPA identification number and annually unique manifest document number (preprinted on CSSI supplied manifest forms, must be added on continuation form).
22	2	Number of pages used (manifest) and page number of this sheet (continuation sheet).
23	3–4	Generator's name, mailing address (address where manifest records are kept), and telephone number. The continuation sheet requires name only.
24-27	5-8	Name and EPA identification number of each transporter.
O and Q	D and F	Phone number of each transporter.
None	9, 10, н	Name, address, EPA identification number, and phone number of the designated disposal facility (preprinted on manifests and continuation sheets provided by CSSI).
28	11	DOT proper shipping name, hazard class, identification number (49 CFR Parts 172.101, 172.202, and 172.203); and,

- a. Designation of whether the waste is hazardous material (check "HM" column), or
- b. Designation, if the waste is a hazardous substance (write "RQ" instead of a check in the "HM" column) and listing of the

67

constituent making the waste a hazardous substance after the proper shipping name, if it is not part of the proper shipping name.

29

12 Enter the number of containers for each waste and the appropriate abbreviation from the table below for type of container.

DM = Metal drums, barrels, kegs

DW = Wooden drums, barrels, kegs

DF = Fiberboard or plastic drums, barrels, kegs

TP = Tanks portable

TT = Cargo tanks (tank trucks)

TC = Tank cars

DT = Dump truck

CY = Cylinders

CM = Metal boxes, cartons, cases (including roll-offs)

CW = Wooden boxes, cartons, cases

CF = Fiber or plastic boxes, cartons, cases

BA = Burlap, cloth, paper, or plastic bags

30-31

13-14 Enter the total quantity of waste at 13 and the unit of measure abbreviation from the table below at 14. The quantity should be as precise as possible.

G = Gallons (liquids only)

P = Pounds

T = Tons (2,000 pounds)

Y = Cubic yards

L = Liters (liquids only)

K = Kilograms

M = Metric tons (1,000 kg)

N = Cubic meters

R	I	EPA waste number (if the waste is hazardous under RCRA).
S	J	Oregon Department of Environmental Quality's approved waste description, per Generator's Waste Profile Sheet description - "Waste Name" and physical state.
32	15	Please enter Waste Profile Sheet number(s) here. If an alternate facility is designated, information and identification number must appear here. Generators may use this space to indicate special transportation treatment, storage or disposal information.
None	16	Generator's Certification. Generator must read, sign by hand, and date this section. Please include this person's title along with printed/typed name in the space provided.

For each lab pack drum, an itemized list of each waste container placed in the drum showing waste description and volume, must be stapled to the manifest. This list should be readily identifiable with a specific drum through a drum numbering or other system.

For certain PCB wastes, the following additional information is required:

- o For any PCB article, the date each item was placed in storage for disposal should be written in Section 15 (this date must also appear on the article container).
- o For each less than 500 ppm PCB liquid container or transformer waste write in PCB concentration on the manifest in Section 15, and staple to the manifest a lab analysis signed by a qualified analyst.
- o For drained and flushed transformers, a statement that each unit was drained and flushed in accordance with 40 CFR 761 must be signed by a responsible representative of the generator and stapled to the manifest.

61

1

-14a-

- o For full transformers or empty ones requiring flushing at Arlington, if it is not possible for the generator to determine the <u>exact</u> gallonage of PCB transformers, a designation of "estimated" volume should be stated on the manifest.
- o For each container of PCB capacitors a list of manufacturer name, serial number, and KVAR for each capacitor inside must be stapled to the manifest.

#### 4.3 TRANSPORTATION INFORMATION

Continuation Sheet #	Manifest Section #	•
33-34	17-18	Enter the name of the person accepting on behalf of the transporter. That person must sign,
		acknowledging acceptance of the waste. Use 17
		for first transporter, 18 for second, and use
		continuation sheet for additional transporters.

#### 4.4 TSD SUPPLIED INFORMATION

Continuation		
Sheet	Manifest	
Section #	Section #	
35	19	The authorized representative of the designated facility must note in this space any significant discrepancy between waste described and waste actually received (see Section 9.1).
None	20	The person accepting waste on behalf of the facility must acknowledge acceptance of the waste by signing and entering date of receipt.



#### 4.5 MANIFEST COPIES

The manifest consists of at least the number of copies which will provide the generator, each transporter, and the Arlington Facility with one copy for their records and an additional copy to be returned to the generator. On CSSI pre-printed manifest forms the use of each copy is designated at the bottom center. After the first transporter signs the manifest, the generator keeps one copy of the manifest and the remaining copies and the original remain with the transporter to accompany the shipment to the disposal facility or to another transporter or treater.

A signed copy of the manifest for loads of waste accepted at the Arlington Facility will be returned to the generator attached to the invoice for the waste shipment.

#### 4.6 UNMANIFESTED WASTES

Wastes that arrive at the facility without manifests or approved Waste Profile Sheets may be returned to the generator as required under 40 CFR Part 262, State of Oregon requirements, and compliance policy.

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	16. GENERATOR'S CERTIFICATION: I hereby declare that the centents of this consignment are fully and accurately described above by proper										
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# CHEM-SECURITY SYSTEMS, INC. P.O. Box 1269 • Portland, Oregon 97207-1269 • (503) 223-1912

May 28, 1985

Neil E. Wallis Time Oil Company 2737 W. Commodore Way 98199 Seattle, Washington

Dear Mr. Wallis:

Enclosed are two copies of our Waste Transportation and Disposal Agreement. Please sign both copies and return both copies to me at the above address. I will then forward your fully-executed copy. We appreciate your business and look forward to serving your hazardous waste needs.

Please feel free to call if you have any questions.

Sincerely,

CHEM-SECURITY SYSTEMS, INC.

Inside Sales Representative

JJ:lh Enclosures

ENCL. 9

#### WASTE TRANSPORTATION AND DISPOSAL AGREEMENT

On this 24th day of May 19 84, the parties, Time Oil Co.

, a Washington corporation with its principal offices at 2737 W. Commodore Way, Seattle, WA 98199 (hereinafter called "Generator"), and CHEM-SECURITY SYSTEMS, INC., a Washington corporation with its principal offices at 10602 N. E. 38th Place, Kirkland, Washington 98033 (hereinafter called "Disposer"), have agreed as follows:

1. WASTE PRODUCTS. The term "Waste Products" refers to those solid, liquid, semi-solid, or contained gaseous materials which are generally described in, and which have physical, chemical, biological or radioactive constituents, characteristics and properties within the specifications stated in, the Supplemental Information Document. The term "Waste Products" also includes containers described in the Supplemental Information Document, if they are to be supplied by the Generator. The term "unit of Waste Products" refers to a single whole container of Waste Products (such as a barrel, drum, box, or tanker load).

Materials and containers shall be considered nonconforming: (i) if they are not in accordance with the warranties, descriptions, specifications or limitations stated in this agreement and the Supplemental Information Document, or (ii) if they have material constituents or components, not specifically identified in the Supplemental Information Document, (a) which materially increase the nature or extent of the hazard and risk undertaken by CSSI in agreeing to handle, load, transport, store, treat or dispose of the Waste Products, or (b) for whose storage, treatment or disposal the Disposal Facility is not designed or permitted.

2. SUPPLEMENTAL INFORMATION DOCUMENT. Where "the Supplemental Information Document" is referred to in this Agreement, the parties understand that such term refers to each single entire document, in that form specified in Exhibit A, (which exhibit is attached hereto and made part hereof), containing the information therein required and executed by the Generator and Disposer. Each Supplemental Information Document shall be numbered chronological sequence. Supplemental | in Information Document, prepared and executed as herein required, shall be considered incorporated into this Agreement and part hereof as of the date and time of Document execution. It is the intention of the parties that each Supplemental Information Document, when incorporated into this Agreement, constitutes a separate undertaking, individually enforceable.

Form No. WMI-55-B (Rev. 10/10/84) c 1980, WASTE MANAGEMENT, INC.

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A Supplemental Information Document, or any amendment thereto, shall be executed, on behalf of Disposer or Generator, only by such persons appointed as authorized agents of the parties for such purposes, which persons are identified, by name or specific position title, in Exhibit B. attached hereto and made part hereof. Either party may, by notice to the other, amend its list of authorized agents, which shall constitute an amendment to Exhibit B at the time such notice is received.

At any time during the term of a Supplemental Information Document, upon the written request of Disposer, the Generator shall: (a) supply an updated written description of the Waste Products or a written certification that the description previously supplied remains true and accurate; or, (b) supply a written certification that a particular load of Waste Products delivered to Disposer constituted a representative sample of the Waste Products described in the Supplemental Information Document; or, (c) supply a representative sample of the Waste Products together with a written certification of the sample's representativeness; or, (d) allow Disposer access to the Waste Products at Generator's facility for the purpose of obtaining one or more representative samples. Forms to be used in providing written Waste Products descriptions, recertifications of previous descriptions, or certifications of representative Waste Products samples shall be supplied by Disposer.

3. TENDER OF DELIVERY. Generator shall tender delivery of the Waste Products to Disposer at those times and places, in those quantities, and in the manner specified in the Supplemental Information Document. Generator shall, at the same time and place, tender to Disposer those completed documents, shipping papers or manifests as are required, for lawful transfer of the Waste Products to Disposer, by valid and applicable statutes, ordinances, orders, rules or regulations of the federal, state, or local governments, including, but not limited to, the Hazardous Materials Transportation Act, the Toxic Substances Control Act and the Resource Conservation and Recovery Act of 1976.

Tender of delivery shall be considered non-conforming if not in accordance with this Section and the specifications of the Supplemental Information Document, or if not preceded by such notification as required by Section 16 (f).

4. DISPOSER RIGHT TO INSPECTION UPON TENDER. Disposer shall have the right, but not the obligation, to inspect, sample, analyze, or test any tendered Waste Products before accepting such products. Failure or refusal of the Generator to provide Disposer with access to any tendered or delivered Waste Products, prior to Disposer's acceptance, shall be deemed a non-conforming tender or delivery of all of the Waste Products tendered or delivered at that time and place. Disposer's

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exercise of, or failure to exercise, its right hereunder shall not operate to relieve Generator of its responsibility or liability under this Agreement.

DISPOSER RIGHTS ON IMPROPER DELIVERY. If the Waste Products, any unit thereof, or the tender of delivery fail in any respect to conform to this Agreement, including the requirements of the Supplemental Information Document, Disposer may, at its exclusive option, (i) reject all Waste Products tendered; or, (ii) accept all Waste Products tendered; or, (iii) accept any unit or units of Waste Products and reject the rest. Provided, however, if a particular unit of Waste Products is determined to be non-conforming solely because of a patent non-conformity in the container, its labeling or marking, which non-conformity, if present in any other tendered container, would be visibly apparent, Disposer's option shall be limited to accepting or rejecting the particular non-conforming unit.

Rejection of the Waste Products must be within a reasonable time after their tender or delivery, not to exceed twenty-four (24) hours. In rejecting any Waste Products, Disposer shall orally notify the Generator of the manner in which the Waste Products or the tender of delivery are non-conforming, such notice to be followed by written notice within five (5) business days.

ACCEPTANCE OF WASTE PRODUCTS. Disposer shall accept any Waste Products which are in conformance with, and which have been tendered in conformance with, this Agreement, including the Supplemental Information Document, and may accept, as provided in Section 5, non-conforming Waste Products. If transportation is to be provided by Disposer, Disposer shall evidence its acceptance by removing such Waste Products from the place of tender. If transportation to the Storage or Disposal Facility is to be provided by Generator, Disposer shall evidence its acceptance by written notice to the Generator, such as through signing shipping papers or the manifest tendered with the Waste Products.

Failure of Disposer to reject the Waste Products, or any unit thereof, as provided in Section 5 shall be deemed acceptance of all tendered Waste Products not so rejected.

Upon acceptance of the Waste Products Disposer shall be precluded from rejecting those Waste Products accepted and, if acceptance of any unit of Waste Products was made with actual knowledge of a non-conformity, Disposer shall be precluded from revoking its acceptance of such unit because of such non-conformity. Acceptance of the Waste Products, or any unit thereof, does not, however, impair, or operate as a waiver of, any right or remedy available to Disposer, including revocation of acceptance, in the event the Waste Products or



their tender are later discovered to be non-conforming.

7. REVOCATION OF ACCEPTANCE. Disposer may, at any time before the condition of the Waste Products has been materially changed (such as by treatment, processing or disposal), revoke its acceptance of any unit or units of Waste Products discovered to be non-conforming.

Discovery by Disposer that any unit of the Waste Products is non-conforming for any reason shall be considered discovery that all units of such Waste Products, accepted at the same time as the non-conforming unit, are non-conforming for the same reasons. Provided, if a particular unit of Waste Products is determined to be non-conforming solely because of a patent non-conformity in the container, its labeling or marking, which non-conformity, if present in any other accepted container, would be visibly apparent, Disposer's option shall be limited to revoking acceptance of the particular non-conforming unit.

Revocation must occur within a reasonable time after Disposer actually discovers or should have discovered the non-conformity. In revoking its acceptance of any Waste Products, Disposer shall notify the Generator of the manner in which the Waste Products are non-conforming.

7a GENERATOR'S OPTIONS IN EVENT OF REJECTION OF REVOCATION OF ACCEPTANCE.

In the event Disposer rejects or revokes its acceptance of Waste Products, and at such time the Waste Products are in Disposer's possession or control, Generator may, within five (5) business days after receipt of notice, notify Disposer of Generator's intent to test the Waste Products, to verify the alleged non-conformity, or to correct any improper containerization, marking or labeling. Generator may, if lawfully permitted, direct Disposer to arrange for such testing or corrections, pursuant to Generator's instructions and at Generator's cost. All testing or corrections must be completed within twenty-one (21) days of Generator's receipt of the rejection or revocation notice. During the period of any testing or corrections, the duty of Disposer with respect to the Waste Products shall be that of a bailee for hire.

Upon mutual agreement of the parties that the Waste Products or any unit are not conforming for the reasons specified in Disposer's notice, the notice of rejection or revocation as to such Waste Products or unit shall be deemed null and void as of the time of its original issuance.

8. DISPOSER OPTIONS AS TO RIGHTFULLY REJECTED OR REVOKED WASTE PRODUCTS.

If Disposer rejects or revokes its acceptance of all or any units of Waste Products, and at such time the Waste Products

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are in Disposer's possession or control, Disposer and Generator shall, in good faith, attempt to amend the Supplemental Information Document to provide for handling of the non-conforming materials. If the parties cannot, within a reasonable time after rejection or revocation (including any time provided for correction or testing in Section 7a), agree on necessary amendments, Generator shall make prompt arrangements for the removal of the non-conforming materials from the Storage or Disposal Facility to another lawful place of disposition.

Generator agrees to pay Disposer its reasonable expenses and charges for handling, loading, stowing, preparing for transport, transporting, storing and caring for any Waste Products returned to Generator pursuant to this Section.

- AND TRANSPORTATION OF WASTE PRODUCTS. Supplemental Information Document specifies that Disposer is to provide loading or transportation services, Disposer shall load or stow and transport Waste Products to the Storage or Disposal Facility herein specified. In the aforesaid event, as between the parties, selection of transportation vehicles or vessels, times of travel and routes shall be solely determined by Disposer unless otherwise specified in the Information Document. selecting Supplemental In transportation vehicles or vessels compatible with the Waste Products, Disposer shall rely on Generator's description of the Waste Products.
- 10. STORAGE AND DISPOSAL. Disposer shall dispose of the Waste Products at the particular facility or facilities, referred to herein as "the Disposal Facility", identified in the Supplemental Information Document. Disposer shall utilize those general storage, treatment, and disposal methods specified in the Supplemental Information Document; however, as between the parties, Disposer shall be solely responsible for determining the specific times and techniques for storage, processing, treatment and disposal of the Waste Products. In determining such techniques, Disposer shall rely on Generator's description of the Waste Products.

If the Supplemental Information Document specifies that Disposer is to provide interim storage of the Waste Products at a "Storage Facility", prior to transportation of the Waste Products to the Disposal Facility, Disposer shall store such Waste Products at such Storage Facility for a period not to exceed ninety (90) days, unless some other period is specified in the Supplemental Information Document.

Disposer may use, distribute or sell any of the Waste Products, or any component or residue thereof, unless otherwise specified in the Supplemental Information Document. 11. TITLE TO WASTE PRODUCTS. At the time Disposer accepts the Waste Products and takes possession and control thereover, title, risk of loss and all other incidents of ownership to the Waste Products shall be transferred from the Generator and vested in Disposer.

A justified revocation of acceptance by Disposer revests title to the Generator, including risk of loss and all other incidents of ownership, at the time such revocation of acceptance is communicated to the Generator.

- 12. TERM. The term of this Agreement shall be as specified in the Supplemental Informtion Document, to commence on the date of execution of such Document, as provided in Section 2.
- 13. RIGHT TO TERMINATE. Either party may terminate this Agreement if the other party (i) has been adjudicated a bankrupt, or (ii) has filed a voluntary petition in bankruptcy, or (iii) has made an assignment for the benefit of creditors, or (iv) a receiver has been appointed for such party. Termination pursuant to this paragraph shall be effective for performance remaining under any and all Supplemental Information Documents.

The Generator may terminate this Agreement, with respect to performance remaining under an identified Supplemental Information Document, if, at any time after execution of such document, the specified Storge or Disposal Facility fails to obtain, or maintain as valid, any license, permit or approval required to allow lawful acceptance and storage, treatment, processing and disposal of the Waste Products at such Facility.

Termination as provided above, or as allowed by Section 22, shall be by notice from the terminating party to the other party, specifying the reason therefor and the effective date thereof, which shall be not less than five (5) days after the date of the notice.

Either party may terminate this Agreement without cause, with respect to performance remaining under an identified Supplemental Information Document, by notice from the terminating party to the other party specifying the effective date of termination which shall be not less than thirty (30) days after receipt of the notice by the non-terminating party.

The right of terminating hereunder is in addition to, and not in lieu of, any right of a party to cancel this Agreement for breach of its terms or conditions.

14. COMPENSATION. For all of the Waste Products transported, stored and disposed of by Disposer, the Generator shall pay Disposer a fee, determined in accordance with the Supplemental Information Document. Disposer shall measure the Waste Products, for the purpose of computing fees, at the time and

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place, and in the manner, specified in the Supplemental Information Document. Disposer determinations so made shall govern unless proved to be in error by Generator.

Fees specified in the Supplemental Information Document shall not be altered during the term of this Agreement except as follows:

- (a) Disposer may, on the first day of any calendar quarter, with thirty (30) days written notice to Generator, increase or decrease fees specified in the Supplemental Information Document. If any Waste Products, to which such fee alterations apply, are delivered to Disposer more than thirty days after Generator's receipt of this notice, Generator shall be deemed to have accepted such fee alterations and the Supplemental Information Document shall be deemed amended in such respect.
- (b) If legislation or regulations, first implemented after date of execution of the Supplemental Information Document, impose taxes, tariffs, fees, surcharges or other charges upon the transportation, storage, processing, treatment or disposal of the Waste Products, the Generator shall reimburse the Disposer for such charges upon the Disposer's submission of an invoice stating that such charges have been levied or paid.

The Disposer shall submit statements to the Generator which shall be paid by the Generator not later than thirty (30) days from date of receipt. Disposer shall retain copies of such statements for a period of at least five (5) years as a record of disposal.

- 15. DISPOSER WARRANTIES. Disposer warrants and represents to the Generator that:
  - (a) Disposer understands the currently known hazards and risks which are presented to human beings, property and the environment in the handling, transportation, storage, treatment, processing and disposal of the Waste Products as they have been described by the Generator in the Supplemental Information Document; and,
  - (b) Disposer is engaged in the business of transportation, storage and disposal of industrial and other wastes, and has developed the requisite expertise for the handling, transportation, storage, treatment, processing, and diposal of such; and,
  - (c) Disposer will handle, load, stow, transport, store, treat, process, and dispose of the Waste Products in a safe and workmanlike manner and in full compliance with all valid and applicable statutes, ordinances, orders,

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- rules and regulations of the federal, state and local governments in whose jursidictions such activities are performed under this Agreement; and,
- (d) Any and all vehicles or vessels, Waste Products containers and personnel to be provided by Disposer in the performance of this Agreement have obtained or will obtain all permits, licenses, certificates or approvals required to comply with valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments.
- Storage or Disposal Facility (or Facilities) described in the Supplemental Information Document has been issued, as of the date of execution of such Document, all permits, licenses, certificates or approvals, required by valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments in which such Facility is located, necessary to allow such Facility to accept and store, treat, process and dispose of the Waste Products as described by the Generator in such Document. Disposer shall provide Generator with reasonable advance notice if any such permit, license, certificate or approval is to expire and not be renewed during the term of a Supplemental Information Document, or becomes the subject of judicial or administrative action seeking revocation or suspension. Such notice shall also be provided if Disposer determines not to seek any necessary permit, license, certificate or approval which becomes required after execution of a Supplemental Information Document.
- 16. GENERATOR WARRANTIES. The Generator warrants and represents to Disposer that:
  - The description of the Waste Products in the Supplemental Information Document is true and correct in all material respects, fairly advises Disposer of the hazards and risks known by the Generator to be incident to the handling, transportation, storage, treatment, processing and disposal of the Waste Products, and is otherwise in full compliance with all materials description valid applicable requirements of and statutes. ordinances, orders, rules and regulations of the federal, state and local governments in whose jurisdictions such Waste Products are to be handled, transported, stored, treated, processed or disposed; and,
  - (b) Waste Products tendered to Disposer will conform to the descriptions and specifications contained in the Supplemental Information Document; and,

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- (c) If Generator receives information, during the term of any Supplemental Information Document, that Waste Products described in such Document, or some component of such Products, present or may present a hazard or risk to persons or the environment, which was not disclosed in the Supplemental Information Document, Generator shall promptly report such information to Disposer. Such information shall include, but not be limited to, any relevant notification of substantial risk required to be given by Generator pursuant to Section 8 (e) of the Toxic Substances Control Act;
- (d) If any load of Waste Products, tendered to Disposer for transportation in a single transportation vehicle, contains a reportable quantity of one or more hazardous substances, as provided in Section 102 of the Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, or regulations adopted thereunder, Generator will, prior to tendering such load to Disposer, provide the person in charge of the Disposer transport vehicle with written notice that the load contains a reportable quantity of such hazardous substance(s), identifying the known or estimated quantity of each such hazardous substance present.
- Generator will prepare the Waste Products transportation and tender to Disposer in accordance with all valid and applicable statutes, ordinances, orders. rules and regulations of the federal, state and local governments in whose jurisdiction such Waste Products are to be tendered to Disposer pertaining to: (i) container specifications for any container not supplied by Disposer; and, (ii) marking and labeling of containers.
- (f) If regulations promulgated or revised under Section 3001 of the Resource Conservation and Recovery Act of 1976 (P. L. 94-580) identify the Waste Products as "hazardous waste," either by characteristics or listing, the Generator, prior to tendering any Waste Products to Disposer has filed or will file with the appropriate governmental agency the preliminary notification required by Section 3010(a) of the above Act, and provide Disposer with evidence thereof.
- (g) The Generator has sole title to Waste Products which will be tendered to Disposer, and is under no legal restraint, statutory, regulatory, administrative or judicial, which prohibits the transfer of possession or title to such Waste Products to Disposer.
- 17. INDEMNIFICATION. Disposer agrees to indemnify and save harmless the Generator. its present and future officers or





directors (or officials), employees and agents, from and against any and all liabilities, penalties, fines, forfeitures, demands, claims, causes of action, suits, and costs and expenses incidental thereto, (including cost of defense, settlement, and reasonable attorney's fees), which any or all of them may hereafter suffer, incur, be responsible for or pay out as a result of bodily injuries (including death) to any person, damage (including loss of use) to any property (public or private), contamination of or adverse effects on the environment, or any violation or alleged violation of statutes, ordinances, orders, rules or regulations of any governmental entity or agency, directly or indirectly caused by, or arising out of breach of any warranties by Disposer, or any negligent or willful act or omission of Disposer, its employees or subcontractors in the performance of this Agreement.

The Generator agrees to indemnify and save harmless Disposer, its present and future officers, directors, employees, agents, subcontractors and assignees, from and against any and all liabilities, penalties, fines, forfeitures, demands, claims, causes of action, suits, and costs and expenses incidental thereto, (including cost of defense, settlement, and reasonable attorney's fees), which any or all of them may hereafter suffer, incur, be responsible for or pay out as a result of bodily injuries (including death) to any person, damage (including loss of use) to any property (public or private), contamination of or adverse effects on the environment, or any violation or alleged violation of statutes, ordinances, orders, rules or regulations of any governmental entity or agency, directly or indirectly caused by, or arising out of breach of any warranties by the Generator, or any negligent or willful act or omission of Generator, its employees or agents in the performance of this Agreement.

18. INSURANCE. Disposer shall procure and maintain, at its expense, during the term of this Agreement, at least the following insurance:

	COVERAGE	LIMITS
(a)	Worker's Compensation	Statutory
(b)	Employer's Liability	\$500,000 each occurence
(c)	Public Liability (bodily injury & property damage)	\$15,000,000 combined single limit
(d)	Automobile Liability (bodily injury & property damage)	\$15,000,000 combined single limit

Public Liability Insurance shall include coverage for completed operations and contractual liability under this Agreement with respect to sudden and accidental occurrences.

Each contract of insurance, and certificate of insurance, shall provide that said insurance shall not be cancelled or materially altered until at least ten (10) days after written notice is received by the Generator. Disposer agrees to furnish insurance with the above requirements, to the Generator before Disposer commences work hereunder.

In the event Disposer is required by law to obtain environmental impairment liability insurance for non-sudden and accidental occurrences at the Disposal Facility, Disposer shall furnish Generator with a copy of the certificate of insurance provided to the regulatory agency imposing the insurance requirement.

19. CONFIDENTIALITY. Disposer and Generator shall treat as confidential property and not disclose to others during or subsequent to the term of this Agreement, except as is necessary to perform this Agreement, (and then only on a confidential basis satisfactory to both parties), any information (including any technical information, experience or data) regarding either party's plans, programs, plants, processes, products, costs, equipment, operations or customers which may come within the knowledge of the parties, their officers or their employees in the performance of this Agreement, without in each instance securing the prior written consent of the other party.

Disposer shall also treat as confidential and shall not disclose to others, except as required by law, information relating to the chemical composition of the Waste Products or the quantity of Waste Products delivered to it by Generator.

Generator shall also treat as confidential and shall not disclose to others, except as required by law, this form of Agreement and the Supplemental Information Document.

Nothing above, however, shall prevent either Disposer or Generator from disclosing to others or using in any manner information which either party can show:

- (a) Has been published and has become part of the public domain other than by acts, omissions or fault of Disposer or Generator or their employees; or
- (b) Has been furnished or made known to Disposer or Generator by third parties (other than those acting directly or indirectly for or on behalf of Disposer or

Generator) as a matter of legal right without restrictions on its disclosure; or

(c) Was in either party's possession prior to the disclosure thereof by Generator or Disposer to each other.

Provided, however, neither party shall release, or cause or allow the release of, information to the communications media, except as required by law, concerning the existence or terms of this Agreement or any Supplemental Information Document, including identification of the Generator of the Waste Products, identification of the Disposal Facility receiving the Waste Products, or the general description, characteristics or constituents of the Waste Products, without in each instance securing the prior written consent of the other party.

The foregoing obligations shall survive the termination or expiration of the Agreement.

- 20. WORK ON GENERATOR'S PREMISES. Generator agrees to provide Disposer, its employees and subcontractors a safe working environment for any work, in performance of this Agreement, which must be undertaken on premises owned or controlled by the Generator. While its employees or subcontractors are on Generator's premises, Disposer will maintain strict work discipline and effect its work in compliance with governmental laws or regulations pertaining to occupational safety and health. Disposer, its employees and subcontractors shall also comply with the Generator's safety procedures while on the Generator's premises, provided such procedures have been specified in the Supplemental Information Document or are attached thereto.
- 21. INSPECTIONS. The Generator shall have the right to inspect and obtain, at its expense, copies of all written licenses, permits or approvals, issued by any governmental entity or agency to Disposer or its subcontractors which are applicable to the performance of this Agreement and for which no claim of business confidentiality or trade secret is asserted; to inspect and test, at its own expense, transportation vehicles or vessels, containers or disposal facilities provided by Disposer; and to inspect the handling, loading, transportation, storage, treatment, processing or disposal operations conducted by Disposer in the performance of this Agreement. Such inspections are encouraged by Disposer, but shall not operate to relieve Disposer of its responsibility or liability under this Agreement.
- 22. EXCUSE OF PERFORMANCE. The performance of this Agreement, except for the payment of money for services already rendered, may be suspended by either party in the event the delivery or



transportation of Waste Products by Generator. transportation, storage, treatment, processing or disposal of Waste Products by Disposer are prevented by a cause or causes beyond the reasonable control of such party. Such causes shall include, but not be limited to, acts of God, acts of war, riot, fire, explosion, accident, flood, or sabotage; lack fuel, materials, adequate power, raw transportation facilities; governmental laws, regulations, requirements, orders or actions; breakage or failure of machinery or apparatus; national defense requirements; injunctions or restraining orders; labor trouble, strike, lockout or injunction (provided that neither party shall be required to settle a labor dispute against its own best judgement).

The party asserting a right to suspend performance under this Section must, within a reasonable time after he has knowledge of the effective cause, notify the other party of the cause for suspension, the performance suspended, and the anticipated duration of suspension. Upon receipt of such notice advising of a material or indefinite suspension of performance, and if such suspension substantially impairs the value of this Agreement to him, a party may, within a reasonable time (not to exceed thirty days), terminate this Agreement as provided in Section 13. If such notice of termination is not provided, this Agreement will lapse with respect to any performance suspended hereunder.

The party asserting a right to suspend performance hereunder shall advise the other party when the suspending event has ended, and when performance will be resumed.

Provided, if title to Waste Products has been transferred to Disposer, Disposer may not suspend performance of this Agreement with respect to such Waste Products; however, if a performance-suspending event occurs after Disposer has taken title to Waste Products but before completion of performance, Disposer may delegate such performance to any other persons lawfully permitted to transport, store, treat or dispose of the Waste Products pursuant to Section 23. In the circumstances described above, the Generator hereby consents to any necessary delegations for which it receives written notice from Disposer.

23. DELEGATION AND ASSIGNMENT. Disposer may at any time, with the prior written consent of Generator, which consent shall not be unreasonably withheld, delegate, orally or in writing, the performance of the work, or any portion thereof, which is by this Agreement undertaken by Disposer. Any such delegation shall not operate to relieve Disposer of its responsibilities hereunder and, notwithstanding any such delegation, Disposer shall remain obligated to the Generator in these undertakings.

Either party may, at any time, upon written notice to the other party, assign its rights under this Agreement.

- 24. INDEPENDENT CONTRACTOR. Disposer is and shall perform this Agreement as an independent contractor, and as such, shall have and maintain complete control over all of its employees, agents, and operations. Neither Disposer nor anyone employed by it shall be, represent, act, purport to act or be deemed to be the agent, representative, employee or servant of the Generator.
- 25. NOTICE. Any notice, communication or statement required or permitted to be given hereunder shall be in writing and deemed to have been sufficiently given when delivered in person or by registered or certified mail, postage prepaid, return receipt requested, to the address of the respective party below:

GENERATOR: Time Oil Company

12005 N. Burgard Road Portland, Oregon 97203

DISPOSER: CHEM-SEC

CHEM-SECURITY SYSTEMS, INC.

P.O. Box 1269

Portland, Oregon 97207-1269

Either party may, by notice to the other, change the addresses and names above given.

26. ENTIRE AGREEMENT. This Agreement represents the entire understanding and agreement between the parties hereto relating to the transportation, storage, treatment, processing and disposal of Waste Products and supersedes any and all prior agreements, whether written or oral, that may exist between the parties regarding same. No terms, conditions, prior course of dealings, course of performance, usage of trade, understandings, purchase orders, or agreement purporting to modify, vary, supplement or explain any provision of this Agreement shall be effective unless in writing, signed by representatives of both parties authorized to amend this Agreement.

In no event shall the preprinted terms or conditions found on any Disposer or Generator purchase or work order be considered an amendment or modification of this Agreement, even if such documents are signed by representatives of both parties: such preprinted terms or conditions shall be considered null and of no effect.

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- 27. WAIVER. Any waiver by either party of any provision or condition of this Agreement shall not be construed or deemed to be a waiver of any other provision or condition of this Agreement, nor a waiver of a subsequent breach of the same provision or condition, unless such waiver be so expressed in writing and signed by the party to be bound.
- 28. MISCELLANEOUS. The validity, interpretation and performance of this Agreement shall be governed and construed in accordance with the laws of the State specified in the Supplemental Information Document.

All paragraph headings herein are for convenience only and are in no way to be construed as part of this Agreement or as a limitation of the scope of the particular sections to which they refer.

In the event of a conflict between the terms or conditions of this Agreement and those of the Supplemental Information Document, the terms and conditions of the Supplimental Information Document shall control.

- SEPARABILITY. If any Section, subsection, sentence or clause of this Agreement shall be adjudged illegal, invalid or unenforceable, such illegality, invalidity or unenforceability shall not affect the legality, validity or enforceability of the Agreement as a whole or of any Section, subsection, sentence or clause hereof not so adjudged.
- The covenants and agreements contained in this Agreement shall apply to, inure to the benefit of and be binding upon the parties hereto and upon their respective heirs, executors, administrators, assigns and successors in interest.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized representatives as of the day and year first above written.

DATE:	Time Oil Company
	By:
	Title:
·	CHEM-SECURITY SYSTEMS, INC.
	By:Roger E. Nelson
	Roger E. Nelson Title: District Manager



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### EXHIBIT A

SUPPLEMENTAL INFORMATION DOCUMENT: NUMBER 85-001

This Document supplements, and is part of, that certain "Waste Transportation and Disposal Agreement," (hereinafter "the Agreement"), entered into by and between Time Oil Company (hereinafter "the Generator"), and CHEM SECURITY SYSTEMS, INC. (hereinafter "Disposer"), on May 24 , 1985. The provisions of this Document shall be incorporated into the Agreement.

1. <u>DESCRIPTION OF WASTE PRODUCTS</u>. The "Waste Products", to which the Agreement refers, are described in the "Generator's Waste Material Profile Sheet," Code Designation <u>E13588</u>, attached hereto and made part hereof.

Containers are to be provided by Generator according to the following specifications:
lined and plastic wrapped dump truck

- 2. <u>TENDER OF WASTE PRODUCTS</u>. Generator shall tender or deliver the above Waste Products to Disposer as follows:
  - (a) Quantity of Waste Products to be Tendered Over Term.
    - (1) Estimated.

      Volume listed in Section "F" of referenced Generator's Waste Material Profile Sheet(s) or in addenda for each profile sheet.
    - (2) <u>Guaranteed</u> (if applicable).

Not Applicable.

(b) Maximum/Minimum Quantity of Waste Products Per Tender (if tendered in installments).

Maximum: same as quantity listed in Section 2(a) above. or in addendum to waste profile sheet.

- (c) Place of Tender.
  Arlington, Oregon
- (d) Time and Frequency of Tender.
  8:00 a.m. to 4:30 p.m. weekdays, except holidays, weather permitting.

c 1984, WASTE MANAGEMENT, INC. (Revised 10/10/84)

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- (e) Manner of Tender (including notification to Disposer).

  Uniform hazardous waste manifest. No free liquid may be present in waste.
- 3. WORK RULES/PROCEDURES AT GENERATOR'S PREMISES. Any specific rules or procedures required by Generator for workers on its premises must be noted here, or attached hereto and initialed by both parties.
- 4. LOADING AND TRANSPORTATION. The Waste Products are to be loaded (or stowed) on vehicles (or vessels) by Generator, and transported to the Storage Facility/Disposal Facility (circle one) by Generator

  If the Waste Products are first transported to a Storage Facility, they will be reloaded (or stowed) on vehicles (or vessels) by N/A, and transported to the Disposal Facility by N/A. If Disposer is to provide transportation the following special transportation requirements (if any) shall apply, pursuant to the Generator's direction:
  - (a) <u>Vehicles or Vessels</u>.

    dump truck
  - (b) Routes.

    Not Applicable.
  - (c) Hours of Transportation.

    Not Applicable.
- 5. STORAGE FACILITY. Disposer shall store the Waste Products at the following storage facility for a period not to exceed days, from which facility the Waste Products will then be removed to the Disposal Facility: Not Applicable

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(Revised 10/10/84)

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- (a) Name/Address of Storage Facility:
- (b) Name/Address of Facility Permittee:
- (c) Permit Number(s)/Initiation and Termination Date(s):
- (d) Permitting Authority(ies):
- 6. DISPOSAL FACILITY. Disposer shall dispose of the above Waste Products at the following disposal facility (or facilities):
  - (a) Name/Address of Facility (Facilities):

The Arlington Facility
Star Route
Arlington, Oregon 97812

(b) Name/Address of Facility Permittee:

Chem-Security Systems, Inc.
P.O. Box 1866
Bellevue, Washington 98009-1866

(c) Permit Number(s)/Initiation and Termination Date(s):

State of Oregon - HW-1, initiated Aug. 26, 1980; continues pending issuance of new permit.

(d) Permitting Authority(ies):

Oregon Department of Environmental Quality.

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- 7. <u>DISPOSAL METHODS</u>: Disposer shall utilize one or more of the following methods for the disposal of the Waste Products:

  secure burial
- 8. <u>EMERGENCY SERVICES</u>: Disposer shall provide emergency transportation, storage or disposal services, with respect to the above Waste Products, pursuant to the following:

As required by site license or at Generator's request

9. RECLAMATION AND/OR SALE OF WASTE PRODUCTS. Disposer is authorized to reclaim, recover and sell, distribute or use the Waste Products, their components or residues, except as specified below:

Not Applicable.

- 10. COMPENSATION. The Generator shall compensate Disposer as follows:
  - (\*) For Transportation, Storage and Disposal of Waste Products.
  - (b) For Imanspowerking Xame Disposal of Waste Products. Per ton:

    Before July 1, 1985 Beginning July 1, 1985

    250 tons per yr. \$110 \$116

    250-1500 tons per yr. \$100 \$106

Fed. tax is \$213 per dry wt. ton. Minimum billing is \$200 per tender. (c) For Disposal of Waste Products Only.

(d) Emergency Services.

Time and mateirals basis

(e) Measurement of Waste Products. Waste Products shall be measured by Disposer for the purpose of computing fees here-under, at the time and place, and in the manner, as follows: Upon acceptance at the Arlington facility using:

facility scale

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(Revised 10/10/84)

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	<b>(</b> f)	13		pany gard Road	·	shall	submit	its
	<b>(</b> g)	) Disposer			sposer will	issue	its bill	ings
		CHEM-SECU STAR ROUT	RITY SYSTE					
							-	
	11. <u>TEF</u> Pro	RM. The ter	rm of the ed in this	Agreement Document.	, with res	pect to	) the Wa	ste
	•	This Agreeme shall remain without caus the other pa	ent shall c in effect se by thirt	ommence on until ten	May 24, 1	985 either	party wi	nd th oi to
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	13. <u>MIS</u>	CELLANEOUS	CONDITIONS					
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				Ву:				
				Title:				
				CHEM-SEC	CURITY SYST	EMS, IN	c.	
				Q <sub>V</sub> .				•
1	17	<b>L</b>		F	Roger E. Ne	lson nager		
(Revi	sed 10/1	.0/84)						
	12. LAW Dood the 13. MIS	shall remain without caus the other part of the other part of the comment shall be laws of the certain decreased above.	The Agree be gover e State of CONDITIONS.  hereto, the shall be "Waste Tr	ment and to ment and to oregon  Time  By:  CHEM-SEC  By:	agree thated an attace on and D Oil Company CURITY SYST	enther written mental in acco	Informat rdance w	ionith

BZTO104(e)046936

### EXHIBIT B

#### AUTHORIZED SIGNATORIES

This Exhibit, being attached to, and forming part of that certain "Waste Transportation and Disposal Agreement" entered into by the undersigned parties on  $\frac{\text{May }24,\ 1985}{\text{May }24,\ 1985}$ , establishes the identities of those persons authorized to execute Supplemental Information Documents on behalf of the parties, to-wit:

### FOR GENERATOR:

### FOR DISPOSER:

Regional Sales Manager	up to \$ 50,000
District Manager or National Accounts Manager	up to \$ 300,000
Regional Vice President or Regional Manager	up to \$ 500,000
Senior Vice President	up to \$1,000,000
President	over \$1,000,000

	11 Company	
By:		
Title: _		
Chem-S	ecurity Systems, Inc.	
By:		_

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· (Revised 10/10/84)

CHYMISECURITY SYSTEMS INC. DISP	OSAL REQUEST RECEIVED MAY 1.5 985
	AEFERENCE CISSSS
SUBJECT	
WASTESTREAM NAME TO REPORT IN TO BE	on
LIQUID EL SOLID E	TE 是是是一种的一种,但是是一种的一种,但是是一种的一种,但是是一种的一种,但是一种的一种,但是一种的一种,但是一种的一种,但是一种的一种,但是一种的一种,但
	LEPA WASTE CODE: A
GENERATOR NAME: TDZ OIL CO.	OCCUPATION OF THE PROPERTY OF
FACILITY ADDRES	MAILING ADDRESS
Time Oil Co.	
J2005 N. Engard Ed.	
Fortland, Or 97203	3 - 6493
GENERATOR CONTACT PERSON NAME: 30bn P. I	Denhem Tel. No. 206 285-2400
Review and approval of the subject waste stream is requested description is detailed on the attached waste profile sheet an	d for disposal at the Chem-Security Arlington site. The complete waste
description is detailed on the attached waste profile sheet an	
DESCRIPTION CHEMICAL COMPOSITION	PROCESS/OPERATION GENERATING WASTE
Contaminated soil (pentechlorophonol, to other calorinated chemicals) non-contami	
	O orbito amodo
WASTE VOLUME REQUESTED FOR DISPOSAL:20	NOW ANNUAL
Based on the Waste Characteristics, Chem-Security proposes to D	ispose of the Waste By (Describe Treatment/Disposal Procedure)
Landfill by Pro Adure 4.	
No five laming a wed.	
C. CSSI, Arlington, OR	
C.C. CSSI, Bellevue, WA	SUBMITTED BY: J. Craig AtKenzie NAME (PRINT)
CSSI, Portland, OR Generator	Literate Million
General	\$10NATURE
	DATE
FOR OREGON DEPARTMENT O	OF ENVIRONMENTAL QUALITY USE ONLY
THE SUBJECT WASTE STREAM HAS BEEN REVIEWED FOR	COMMENTS:
DISPOSAL AT THE ARLINGTON SITE AND IS HEREBY:	COMMENTS.
State of Oregon	
Department of Environmenta Collins	
on May 14, 1985	TO 10
of Elulato & China	TOLS010105
Solid Vesto Division Hezerdous Vesto Operations	
自治學學院 的复数多种 自由自治疗	

GENERATOR'S WASTE MATERIAL	PROFILE SHEET
A GENERAL INFORMATION	10776631 a120185
GENERATOR NAME L. Time Oil Co.	I IRANSPORTER (Cresham Transfer Inc.
FACILITY ADDRESS 12005 N. Burgard Rd.	TRANSPORTER PHONE: (503) 255-7900
Portland, OR	GENERATOR USEPA ID 10 10 10 10 19 15 19 17 15 4 13
	J GENERATOR STATE ID. L
TECHNICAL CONTACT L. John P. Denham	TITLE (Environmental Manager PHONE (296) 285-2409
NAME OF WASTE: PCP contaminated soil	
PROCESS GENERATING WASTE: LCLEAR UP of contaminated	
B PHYSICAL CHARACTERISTICS OF WASTE	
COLOR OUT NONE DATE PHYS	SICAL STATE @ 70°F TANKERS FREE LIQUIDS
ODE IS NOW	MULTILAYERED PREE LIGOIOS
	BI-LAYERED TES WAND
DESCRIBE	SINGLE PHASED VOCUME
pm: □<2 □ 7.1·10 □ N/A SPECIFIC □< 8	1.3-1.4 FLASH C < 70°F CLOSED CUP
24 10 1 - 12.5	1.5-1.7 TO'F - 100'F TO NO FLASH OPEN CUP
☐ 4.1-6.9 ☐> 12.5	> 1.7
7 EXACT	
C CHEMICAL COMPOSITION (TOTALS MUST ADD TO 100%)	D METALS TOTAL (PPM) EPA EXTRACTION PROCEDURE (mg/L)
Contaminated soil	SELENIUM (Se)L -0-
pentachlorophenol 182	29   BARIUM (Ba)  ()   SILVER (Ag)
tetrachlorophenol .007	71 % CADMIUM (Cd)0- COPPER (Cu)(1-
trace amounts of other	
chlorinated chemicals less than, 000	)1 % MERCURY (Hg) ZINC (Zn)
	2 1/2 CHROMIUM HEX (Cr + 6)
	THE OTHER COMPONENTS - TOTAL (PPM)
	AT SULFIDESO_ PHENOLICSO_
F SHIPPING INFORMATION	G HAZARDOUS CHARACTERISTICS
D.O.T. HAZARDOUS MATERIAL? THE YES NO	REACTIVITY: TO NONE PYROPHORIC SHOCK SENSITIVE
<del>-</del>	n
PROPER SHIPPING NAME Waste pentachlorophenol mixt	MLD.
HAZARO CLASS (ORY-E 1.0. NO. UNA 2020 RO (10	The Diner Hazarboos Characteristics.
METHOD OF SHIPMENT: BULK LIQUID LIBULK SOLID	
DRUM (TYPE/SIZE)	PESTICIDE MANUFACTURING WASTE OTHER
ANTICIPATED VOLUME GALS GOOD CUBIC Y.	ARDS USEPA HAZARDOUS WASTE? TYES NO
OTHER L	USEPA HAZARDOUS CODE(S) U242
PER. TO ONE TIME WEEK MONTH	S STATE HAZARDOUS WASTE? 🛣 YES 🗀 NO
OUARTER VEAR	STATE CODE(S)
H SPECIAL HANDLING INFORMATION	TOLS010106 —
	ADDITIONAL PAGE(S) ATTACHED
I HEREBY CERTIFY THAT ALL INFORMATION SU CETTED IN THIS AND ALL ATTA SUSPECTED HAZARDS HAVE BEEN DISCLOSED	ACHED DOCUMENTS IS COMPLETE AND ACCURATE, AND THAT ALL KNOWN OR
AUTHORIZED SIGNATURE	TITLE DATE
How P. Dinform	Environmental Manager February 19, 1985



# CHEM-SECURITY SYSTEMS, INC.

P.O. Box 1269 • Portland, Oregon 97207-1269 • (503) 223-1912

CSS

June 7, 1985

Mr. John Denham Time Oil Company 2737 N. Commodore Way Seattle, Washington 98199

Dear John:

Enclosed are the two copies of replacement pages for our Supplemental Information Document that we discussed by phone today. Please replace them in the original contracts that you have and return both contracts to me.

If I can be of further assistance do not hestitate to call me.

Sincerely,

CHEM-SECURITY SYSTEMS, INC.

Joyce Johnson

Inside Sales Representative

Enclosure

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# CHEM-SECURITY SYSTEMS, INC.

P.O. Box 1269 • Portland, Oregon 97207-1269 • (503) 223-1912

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Sincerely,

CHEM-SECURITY SYSTEMS, INC.

Joyce Johnson

Inside Sales Representative

Enclosure

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SEATTLE TACOMA PORTLAND STOCKTON RENO RICHMOND SAN PEDRO LOS ANGELES



## TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

July 10, 1985

Northwest Vacuum Truck Service, Inc. P.O. Box 24402 Seattle, WA 98124

Dear Sirs:

Attached is check 24474 as payment in full for work done to date in accordance with contract dated February 19, 1985 as shown on your invoice 2891 dated July 2, 1985.

Sincerely,

John P. Denham

Environmental Manager

Attachment a/s

JPD/ch



### TIME OIL CO.

P.O. BOX 24447 TERMINAL ANNEX SEATTLE, WASHINGTON 98124

PAY TO THE ORDER OF July 9, 1985

NORTHWEST VACUUM TRUCK SERVICE, INC. P.O. BOX 24402 SEATTLE, WA 98124

PROTECTED AMOUNT

\$ \*\*\*\*\*9,000.00\*

BY

BY

#024474#

1:0213081761

30991597#

TIME OIL CO.

24474

11/7/			E OIL CO.			
INVOICE	REFERENCE NO.	AMOUNT	INVOICE	REFEREN	NCE NO.	THUOMA
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's TAP 110 4/81			CHECK DATE	7-9-85	DISCOUNT	
			CHECK NO.	24474	TOTAL	\$9,000.00

WHEN DETACHED AND PAID, THIS CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE ITEMIZED ACCOUNT



## Northwest Vacuum Truck Service, Inc.

No

2891

P.O. Box 24402 · Seattle, WA. 98124 (503) 226-1090

CHARGE TO Time Oil Company 2737 W. Commodore Way Seattle, WA 98199

ATTENTION:

John Denham

INVOICE NO.	INVOICE DATE	TERMS	WORK COMPLETION DATE	YOUR PURCHASE ORDER NUMBER	YOUR PURCHASE ORDER DATE	TAXABLE
2891	7-2-85	2 percent - 10 days NET 30 days	6-28-85			FOR RESALE TAX EXEMPT
	DESCRIPTION OF WORK RI	UNIT QUANTITY OR LABOR HOURS	RATE	AMOUNT		

Remove containinated soil. Have transported to Arlington Land Disposal Site. First phase of an estimated 2 phase job.

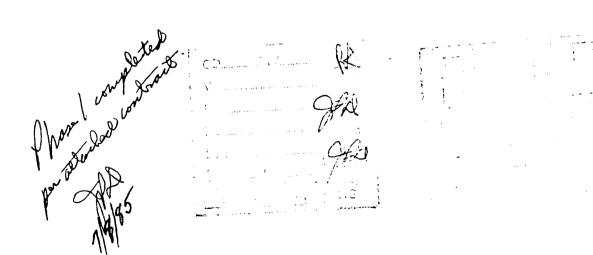
 $3 \text{ days} - \$600.00 = \$1,800.00 \times 3 \text{ trucks}$ 

\$ 5,400.00

Labor and equipment @ \$1,200.00 per day x 3 days

3,600.00

\$ 9,000.00



Unpaid invoices more than 30 days past due will be subject to a service charge of 11/2 percent per month.

#### CONTRACT

The parties to this agreement are Time Oil Co. (hereinafter termed owner) and Northwest Vacuum Truck Service, Inc. (hereinafter termed contractor) whereas:

Owner has a volume of earthen material located in Portland, Oregon and owner is desirous of having that material removed.

Contractor is willing to undertake that task upon the terms and conditions set forth below.

Therefore, in consideration of the agreements contained herein, the parties agree as follows:

- Contractor agrees to remove the material from its present location, load
  it into suitable transportation vehicles and transport it to a disposal
  facility approved by the Oregon Department of Environmental Quality.
- 2. The material to be removed by contractor is generally set forth on the drawing labeled exhibit 1, attached hereto and incorporated by this reference. Prior to work under this agreement, a representative of owner will meet with contractor at the site and the extent of the material to be removed will be more specifically delineated at that time.
- 3. The commencement date for work will be February 21, 1985 or such other date as may be agreed upon by the parties following coordination with the Department of Environmental Quality and the authorized disposal facility. Work is intended to be divided into two phases. First phase consists of material removal to an agreed upon depth. Then there will be a several day delay while additional tests are conducted to determine if further removal is required. If so, phase two removal actions are to be effected. Should there be any need to continue removal, above process is to be repeated until ultimate removal is accomplished.
- 4. For each day worked, owner agrees to pay contractor the sum of 1200 dollars for labor and equipment pertaining to soil removal plus 600 dollars for each truckload of soil transported. A day worked shall be one wherein earth moving equipment, necessary to perform the work, has been utilized to the fullest, reasonably possible, extent for a period of not less than 8 hours. Truck shall be a standard 18 yard rated capacity vehicle. Payment will be made upon completion of the work and receipt by owner of written acknowledgement from the approved disposal facility that all material removed and transported by contractor has been received at that facility.
- 5. Contractor indemnifies and agrees to defend and hold owner harmless from any and all costs, claims, liabilities and damages arising out of contractors work under this contract.
- 6. Contractor hereby declares that it is engaged as an independent contractor and agrees to perform the work as independent contractor and not as an employee of owner. Contractor has and hereby retains the right to exercise full control and supervision of the work and full control over the employment, direction, compensation and discharge of all persons assisting in the work.

Exec. 4

- 7. Contractor agrees at its expense to obtain all governmental permits, licenses and approvals and comply with all laws, rules, regulations and requirements now or hereafter existing necessary for the accomplishment of the work to be performed by contractor under this agreement.
- 8. Contractor especially acknowledges its understanding that portions of the material to be removed, transported and disposed of under this agreement have been found to contain commercial pentachlorophenol in concentrations ranging from 0 ppm to 1820 ppm. Contractor agrees to take all necessary precautions for the protection of persons and property that may be required or prudent in the removal and transportation of that material.
- 9. Contractor agrees to maintain workmans' compensation insurance in the form and amounts required by the laws of the state of Oregon and broad form comprehensive public liability insurance with minimum limits of \$1 million per person and \$1 million per accident for bodily injury and \$500,000 per accident for property damage. Contractor shall promptly deliver to owner certificates of said insurance, naming owner as an additional insured before commencing work and such certificate shall provide that said insurance shall not be cancelled prior to 30 days by written notice to owner.
- 10. Contractor agrees that before commencement of any work hereunder, it will promptly furnish owner with a faithful performance bond in an amount to 53,000 dollars guaranteeing completion of all work and performance of all obligations undertaken by contractor under this agreement.
- 11. The nature, validity and interpretation of this contract shall be governed by the laws of the state of Washington.

Dated this 19th day of February 1985.

OWNER
Time Oil Co.

CONTRACTOR
Northwest Vacuum Truck Service Inc.

рÀ

John P. Denham

Environmental Manager

July H

General Manager





## TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O BOX 24447, TERMINAL STATION SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

July 29, 1985

Chem-Security Systems, Inc. P.O. Box 1866 Bellevue, WA 98009

Dear Sirs:

Attached is check 24607 as payment in full for disposal services as shown on your invoice 1447 dated June 30, 1985.

Sincerely,

John P. Denham Environmental Manager

Attachment a/s

JPD/ch



### TIME OIL CO.

P.O. BOX 24447 TEPMINAL ANNEX SEATTLE, WASHINGTON 98124

PAY TO THE CPDER OF

7-29-85

CHEM-SECURITY SYSTEMS, INC. P.O. BX 1866 BELLEVUE, WA 98009 S \*\*\*27,270.88\*\*\* S \*\*\*27,270.88\*\*

BY WAS SIGNATURES PERSUREET

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	Inv. # 1447						
(4.6			CHECK DATE	7 20 05	DISCOUNT		
			CHECK NO.	7-29-85 24607	TOTAL	\$27, 270, 88	

WHEN DETACHED AND PAID, THIS CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE ITEMIZED ACCOUNT



CHEM-SECURITY SYSTEMS, INC.

STAR ROUTE ARLINGTON 503/454-2643

OR 97812

SERVICE PROVIDED BYS ARLINGTON PACILITY

TIME DIL CO 12005 N BURGARD RD PORTLAND OR 97203 THIS IS AN INVOICE FOR THE PENT CHARLES

NET 30 DAYS AFTER INVOICE DATE

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MIT TO DBESS P. O. BOX 1866 BELLEVUE

WA 98009

PLEASE PAY
THIS AMOUNT

CONTINUED

NK YOU FOR YOUR BUSINESS!

ORIGINAL INVOICE

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CHEM-SECURITY SYSTEMS, INC.

STAR ROUTE ARLINGTON

OR 97812

NET 30 DAYS AFTER INVOICE DATE

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SERVICE PROVIDED BY: ARLINGTON FACILITY

TIME OIL CO 12005 N BURGARD RD PORTLAND OR 972**0**3

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REMIT TO ADDRESS

P. O. BOX 1866

WA 98009

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PLEASE PAY THIS AMOUNT

27,270.88\*1

THANK YOU FOR YOUR BUSINESS!

13813 CTEGON ACCIDENT

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	3.	Generator's Name and Mailing Address		<del>7 1 2 0</del>	A. State Manifest Document Number					
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	15. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)					- 01	<u> </u>	<u> </u>		
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	3. Generator's Name and Mailing Address		<del>) 1 5 5</del>	A. State Manifest Decument Number						
	Time Oil Co. 12005 N. Burgard Road Fortla	nd. Grecon 97203								
11	4 Generator's Phone (206) 285-2400	,		B. State Ge	nerator's ID					
$\mathbf{H}$	5. Transporter 1 Company Name	6. US EPA ID Number		C. State Tra	nsporter's ID					
11	Grecham Transfer Inc.	ORD 05 09 7-3	3. 4. 3. 7	D. Transpor	<del></del>	3) 255-7900				
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1		<u> </u>	<del></del>	F. Transport		·····				
11	9. Designated Facility Name and Site Address	10. US EPA ID Number		G. State Fai	cility's ID					
11	Chem-Security Systems, Inc. Star Route			H. Facility's	Phone					
11	Arlington, Oregon 97812	ORD 089 452 35	53	503-45	4-2643					
	11. US DOT Description (Including Proper Shipping Name, Hazard	Class, and ID Number)	12. Cont	. 1	13. 14. Total Unit	EPA/I.				
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	16. GENERATOR'S CERTIFICATION: I hereby declare that the cont	ents of this consignment are fully and	accurately d	escribed abov	re by proper					
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OREGON ACCIDENT

٠.	4	UNIFORM HAZARDOUS 1. Generator's US EPA WASTE MANIFEST 030095	Dagu	anifest ment No.	2. Par of	ge 1 Information of requirements	ion a th	e shaded areas is oderal law.			
1		3. Generator's Name and Mailing Address Time Oil Co.		1 1 0	A. Sta	ate Manifest Docum	is et 1¥un	er			
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l		5. Transporter 1 Company Name 6. Gresham Transfer Inc.	US EPA 10 Number R. D. 07 5 0 9 7	3 1, 3		ite Transporter's ID		255-7900			
1	╟	7. Transporter 2 Company Name 8.	US EPA ID Number	949		te Transporter's ID		222-1700			
- 1	П		<u> </u>	<u> </u>	F. Tro	nsporter's Phone					
		9. Designated Facility Name and Site Address 10.  Chem-Security Systems, Inc.	US EPA ID Number		G. Sta	ate Facility's ID					
- 1		Star Route Arlington, Oregon 97812	ORD 089 452 35	3	i	cility's Phone 13-454-2643					
		11. US DOT Description (Including Proper Shipping Name, Hazard Class, and	(ID Number)	12. Cont	oiners	13.	14.	EPA/L			
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		ONITORIN TIAZARDOOS	OIOI'S US EPA	Docu	anifest ment No.	2. Po	ge 1 Information not requ	in ion in the ired by F	e shaded areas is ederal law.
- 1		3. Generator's Name and Mailing Address	<u> </u>	وتولك	137	A. Sto	ate Manifest Docu:	sest Num	ber
1		Time Cil Co.							
.	11.	12005 N. Eurgard Road Fortl 4. Generator's Phone (206) 285-2400	Land, Cre	egon 97203		B. Sto	ite Generator's ID	*	
	1 -	5. Transporter 1 Company Name	6.	US EPA ID Number		C. Sto	ate Transporter's IE	<del></del>	
1	П	Grechem Transfer Inc.	los	· 구 O 록 O O 7·3	· 1 <sub>1</sub> · 3 · 7		insporter's Phone		) 255 <u>-</u> 7000
		7. Transporter 2 Company Nome	8.	US ÉPA ID Number	<del></del>	E. Sta	ite Transporter's IC		
. [				· · · · · · · · · · · · · · · · · · ·	<u>· ·                                  </u>		insporter's Phone		
	$\prod^{9}$	9. Designated Facility Name and Site Address Chara Facility Sylatoms Inc.	10.	US EPA ID Number		G. St	ate Facility's ID		
~	П	Chem-Security Systems, Inc. Star Route				H. Fo	cility's Phone		
-		Arlington, Oregon 97812		ORD 089 452 35	3	50	3-454-2643		
		11. US DOT Description (Including Proper Shipping Name, Ha.	zard Class, and	(ID Number)	12. Cont	ainers	13. Total	14. Unit	EPA/I.
-		НМ			No.	Type)	Quantity	Wt/Vol	Woste No.
	ľ	•       RQ   Solid Waste Fentachlorophen	ol Harta	mo CPICE	/\		له. سه		
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		<ul><li>FCF Contaminated Soil, Soli</li><li>b.</li></ul>	a			١	10000		33.7
		c.				Al	HEA 6 D	Q E	L88554
		d.					-1023Q	LL	+ GAL
1	ħ	15. Special Handling Instructions and Additional Information	Waste Prof	file Sheet Number(s)	1		7 01		
		a. E13588				Į	J-81		
1		b. c.		•					
1	1	d.							
1	h	16. GENERATOR'S CERTIFICATION: I hereby declare that the	contents of this	consignment are fully and o	accurately d	escribe	d above by proper		
		shipping name and are classified, packed, marked, and according to applicable international and national govern	labeled, and a	are in all respects in prope	r condition	for trai	nsport by highway		
11	L							[_	Date
1		Printed/Typed Name		Signarure )	1	/	)		onth Day Year
1	1.	John F. Denham Envoirnmental M	anager	Tropino!	XX2	nogh	en _	10	6 2. 6 8. 5
Į,		17. Transporter 1 Acknowledgement of Receipt of Materials Printed/Typed Name		Liunatore					Date onth Day Year
RANSPORTER		Fill Terrison		1500	4,				· 61 2· 61 8· 5
P	1	18. Transporter 2 Acknowledgement of Receipt of Materials							Date
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	1	19. Discrepancy Indication Space There wa	o on	ly / DT	T N	ي ي	a, no	ST,	5.
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Îâ		sure Schooling (BT)	0			,			,
1	2	Tracilly Owner or Sperator: Certification of receipt of hozo	ordous materia	ls covered by this manifest	except as n	oted in	Hem 19.		
İ		7			_1	•		[_	Date
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Å		UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA D.R. D. O. O. 9. 5	97543 P	Manifest ument No.	2. Po		rmation in t required by	he shaded are now. Federal law.
	3.	Generator's Name and Mailing Address Time Oil Co.			J 1 J J	A. Sid	ote Manifest (	Document Nu	mber
	4.	12005 N. Burgard Road Generator's Phone (206) 285-2400	Fortland, Cr	econ 97203		B. Sto	ite Generator	's ID	
		Transporter 1 Company Name	6.	US EPA ID Number		C. 510	ste Transporte	er's ID	
-		Gresham Transfer Inc.		D 0 5 0 9 7 3	437		nsporter's Ph		1) 255-7500
411	7.	Transporter 2 Company Name	8. 1	US EPA ID Number		<b></b>	nsporter's Pho		
	9.	Designated Facility Name and Site Address	10.	US EPA ID Number			te Facility's II		
		Chem-Security Systems, Inc.							
Ш		Star Route Arlington, Oregon 97812	1.	ORD 089 452 35	53		cility's Phone 33-454-26	43	
$\ $		. US DOT Description Including Proper Shipping	Name, Hazard Class, and	ID Number)	12. Cont	oiners .	13.	14.	EPA/I.
		НМ			No.	470g	Total Quantity	y Unit W1/Va	Waste No.
	a.	RQ Solid Waste Fentachlord IMA 2020 (PQ 10)	ophenol Mixtu	re, OPM-E,	0.06		532	70 P	U2142
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-	J.	Additional Descriptions for Materials Listed Abave	e*		<u> </u>	K. 19:	pling Codes	for Westes L	I sīpd Ab∳ŒU, YD.
		a. b. POP Contaminated Soil,	Solid			3	1358	381_	22.3
		c.	•	•		A	REA S	DG	15 LSS542
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Ī		. Special Handling Instructions and Additional Inf	ormation Waste Pro	ile Sheet Number(s	;)	- I	)-8/	<del>3                                    </del>	
		<b>b.</b> E13588				L	) - 0/		
		c.							
-		d.							
		GENERATOR'S CERTIFICATION: I hereby declar shipping name and are classified, packed, mar	ked, and labeled, and a	ire in all respects in propi	accurately d er condition	escribe for trai	d above by pr isport by higi	rop <b>er</b> hway	
		according to applicable international and nation	nal governmental regulat	ions.	_			Γ.	Date
1		Printed/Typed Name		Signature	1		)		South Day Year
+	_	<u>John F. Denkan Envoirnmer</u> Transporter I Acknowledgement of Receipt of M	ntal Kanager	Birn F	.,	Je K	d-m-		6 2 6 8 5
٢		Printed/Typed Name		Signature		-	9 , 1		Nonth Day Year
		Elgin Taylor	<u></u>	6kg		La	4/1		6 13 .6 18 .5
-		Transporter 2 Acknowledgement of Receipt of M Printed/Typed Name	Naterials	Signature		/			Date Ionth Day Year
		Timed, typed traile		. Signatore		,		ı"	onth Day Year
T	9.	Discrepancy Indication Space There U	vas Only	L / DT	re	ca	, no	ot 6	2 -
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		Joice Johnson. (	BT)				•		!
. [	Ġ	Facility Owner or Operator: Certification of recei	pt of hazardous materia	s covered by this manifest	except as n	oted in	Item 19.		
-		17		5 H	-A.		<del>,,,</del>		Date
	$\int_{-\infty}^{\infty}$	UPD MIline		- 1 JU/	Sell	IJ	IME	96) [	612785
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	4.	204 285-21:00				ate Generator's ID			
	4. Generator's Phone (206) 285-21:00								
11	5.	. Transporter 1 Company Name	6. US EPA ID Numl			ate Transporter's IC		· · · · · · · · · · · · · · · · · · ·	
	7	Gresham Transfer Inc.	0.R.D.0.5.0.9.7 8. US EPA ID NUM		<del></del>	onsporter's Phone ate Transporter's IC		255	
1					<b></b>	insporter's Phone			
	9.	Designated Facility Name and Site Address	10. US EPA ID Numl	per	G. Si	ate Facility's ID			
Ш		Chem-Security Systems, Inc. Star Route			H Fo	cility's Phone			
		Arlington, Oregon 97812	ORD 089 452	35 <b>3</b>		3-454-2643			
	11	1. US DOT Description (Including Proper Shipping Name, Haza	ard Class, and ID Number)	12. Cont	ainers	13. Total	14. Unit	EPA/	
		HM	· · · · · · · · · · · · · · · · · · ·	No.	Туре	Quantity	W1/Vol	Wast	
	<b>a</b> .	RQ Solid Maste Fentachlorophen MA 2020 (RQ 10)	ol Mixture, CRM-E,	0 01	DT ·	5.4620	P	U214	
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$\ \cdot\ $	J.	Additional Descriptions for Materials Listed Above		<del> </del>	K. Ho	ndling Codes for V	Vastes Lis	L ted Above	
П		b. FCP Contorinated Soil, Solid			WPS	To	U. FT	CU.	
$\  \ $		C.	•		EI	3588	<del></del>	23	
П		d.			ARE	A S D	Q PR	LBS	
		. Special Handling Instructions and Additional Information	Waste Profile Sheet Numbe	r(s)	17-1	12390		GAL	
П		о. E13588 <b>b.</b>				<u> </u>			
		<b>c.</b>					ン1		
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	16.	GENERATOR'S CERTIFICATION: I hereby declare that the co shipping name and are classified, packed, marked, and la	entents of this consignment are fully or beled, and are in all respects in pr	and accurately d	lescribe for trai	d above by proper	,		
		according to applicable international and national government					-	Date	
		Printed/Typed Name	Signature D	D K		1	Ма	onth Day	
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		Transporter 1 Acknowledgement of Receipt of Materials Printed/Typed Name	Signature	11	7		L	Date	
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)	18.	Transporter 2 Acknowledgement of Receipt of Materials						Date	
-		Printed/Typed Name	Signature				Н	onth Day	
19. Discrepancy Indication Space									
	19. Discrepancy Indication Space								
	20.	Facility Owner or Operator: Certification of receipt of hazard	daus materials covered by this mani	fest except as n	oted in	hem 19.			
r		Printed/Typed Name	Signature					Date	
<b>/</b>  -		······································	12.3.000	_	$\sim$		,-10		

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Join F. Denham Envoirnmental Langer for Signature Date  Printed/Typed Name Signature Signature Date  Bill Corrison O.6   2.8   6   6   6   8   6   6   6   8   6   6	11		ONII OKM MAZARDOOS	O 9. 5. 9. 7. 5.		sofest med No.	2. Fa	not rea	tion in the jired by Fi	e shaded areas ederal law.
A Generator's Plane (205 ) 255-24(00   5. transporter's Plane (503) 255-73   5. transporter's Plane (503) 255-73   7. transporter's Plane (503)			Tire Oil Co.		70.00	•				ber
Greek an Transfer Inc.  D. R. D. O. S. O. 9. 7. 3. 1. 2. 7.  Transporter 2 Computer Name  B. USERA ID Number  E. State Transporter's ID  F. Transporter's Phone  9. Designated Socially Name and Size Address  10. USERA ID Number  Chem. Security Systems, Inc.  Star Route  Arlington, Oregon 97812  ORD 089 452 353  11. US DO Description Including Proper Shipping Name. Hazard Class, and ID Number  11. US DO Description Including Proper Shipping Name. Hazard Class, and ID Number  12. Conditions  13. 154  No. Type Ovanity  W//Ve)  13. 154  Worke No.  14. 2020 (RQ 10)  15. Additional Descriptions for Moterials Lined Above  a. FOF Constantinated Soil, Solid  b. C.  d.  15. Special Monding Instructions and Additional Information Waste Profile Sheet Number(s)  15. Special Monding Instructions and Additional Information Waste Profile Sheet Number(s)  16. GENERATOR'S CERTIFICATION: Thereby declare that the contents of this consignment are fully and accurately described obove by proper thisping name and are classified, protect, and are opiniously microbinated and orientational over intentional power member (s)  16. GENERATOR'S CERTIFICATION: Thereby declare that the contents of this consignment are fully and accurately described obove by proper thisping name and are classified, protect, and are plantable microbinal and restrictional power member (s)  16. GENERATOR'S CERTIFICATION: Thereby declare that the contents of this consignment are fully and accurately described obove by proper thisping name and are classified, protect, and are plantable microbination and architactional power member (s)  16. GENERATOR'S CERTIFICATION: Thereby declare that the contents of this consignment are fully and accurately described obove by proper thisping name and are classified, protect, and are classified, protect, and are classified, protect, and are classified and are in all respects in proper condition for transport by highway accurately above the protect of the protect of the protect of the protect of the protect of the protect of the prot				nd, Gregon 97	7203		B. Sto	ite Generator's ID		
7. Transporter 2 Company Name   8. US EPA ID Number   1. Transporter 10   1. Transpo			• • • • • • • • • • • • • • • • • • • •					<del></del> _		
P. Designated facility Name and Size Address Chem-Security Systems, Inc. Star Route Addington, Oregan 97812  ORD 089 452 353  11. US DOI Description (including Proper Shipping Name, Harard Class, and ID Number)   India	11					<u>l. 37</u>	<del>!</del>			<u>) 255-790</u>
Chem-Security Systems, Inc.  Star Route Arlington, Oregon 97812  ORD 089 452 353  Proceedings Proper Shipping Name, Hazard Class, and IO Number)  Inc. Solid Master Fontachlorophenol Mixture, CRI-E, I.A. 2020 (RQ 10)  I.A.		7. 110	mponer 2 company realie	1						
Star Route Arlington, Oregon 97812  ORD 089 452 353  DRD 089 452 452 353  DRD 089 452 452 353  DRD 089 452 452 353  DRD 089 452 452 353  DRD 089 452 452 452 452 452 452 452 452 452 452				10. US EPA	ID Number		G. Sto	ate Facility's ID		
Arlington, Oregon 97812  11. US DOI Description Uncluding Proper Shipping Name. Hazard Class. and ID Number)  12. Continen  13. Id. Id. Including Proper Shipping Name. Hazard Class. and ID Number)  14. Continen  15. Continen  16. Including Codes for Worse No. Type  17. 2020 (RQ 10)  18. E13568  19. Special Monding Instructions and Additional Information. Waste Profile Sheet Number(s)  19. Special Monding Instructions and Additional Information. Waste Profile Sheet Number(s)  19. Special Monding Instructions and Additional Information. Waste Profile Sheet Number(s)  19. Special Monding Instructions and Additional Information waste Profile Sheet Number(s)  10. GENERATOR'S CERTIFICATION: hereby declare that the contents of this consignment are fully and accurately described above by proper shapping name and are distributed and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.  10. GENERATOR'S CERTIFICATION: hereby declare that the contents of this consignment are fully and accurately described above by proper shapping name and are distributed above by proper according to applicable international and national governmental regulations.  10. GENERATOR'S CERTIFICATION: hereby declare that the contents of this consignment are fully and accurately described above by proper shapping name and are distributed above by proper according to applicable international and national governmental regulations.  10. GENERATOR'S CERTIFICATION: hereby declare that the contents of this consignment are fully and accurately described above by proper shapping name and are distributed above by proper shapping name and are distributed above by proper shapping name and are distributed above by proper shapping name and are distributed above by proper shapping name and are distributed above by proper shapping name and are distributed above by proper shapping name and are distributed above by proper shapping name and are distributed above by							H. Fo	cility's Phone		<del></del>
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Solid Waste Fentachlorophenol Mixture, ORM-E, QOI DT S. 20 P U2L2  1. Additional Descriptions for Materials listed Above  a. FOF Contaminated Soil, Solid  b. C. d.  1. Special Mandling Instructions and Additional Information Waste Profile Sheet Number(s)  a. E13588  c. d.  1. GENERATOR'S CERTIFICATION: Thereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.  Printed/Typed Name  1. Transporter 2 Acknowledgement of Receipt of Materials  Printed/Typed Name  Signature  Signature  Manif. Davie  Manif	$\ $			lass, and ID Number)			ı	Total	Unit	
I.A. 2020 (RQ 10)  J. Additional Descriptions for Materials listed Above  a. FOF Conternated Soil, Solid  b.  C.  d.  J. Additional Descriptions for Materials listed Above  a. FOF Conternated Soil, Solid  b.  C.  d.  J. Additional Descriptions for Materials listed Above  a. FOF Conternated Soil, Solid  b.  C.  d.  J. Special Mandling Instructions and Additional Information Waste Profile Sheet Number(s)  a. E13568  c.  d.  J. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and lobeled, and are in all respects in proper condition for transport by highway according to applicable international and notional governmental regulations.  Printed/Typed Name  John F. Denham Envertmental Linearer  John F. Denham Envertmental Linearer  Final Markoniedgement of Receipt of Materials  Printed/Typed Name  Signature  Manif. Day V.  John Day V.  Printed/Typed Name  Signature  Manif. Day V.  Manif. Day V.  John Day V	$\ \cdot\ $					NO.	type	Quantity	W1/Vol	
d.  J. Additional Descriptions for Materials Listed Above  d. FCF Conterinated Soil, Solid  E73588 CU.FT CU.YD.  E73588 CU.FT CU.YD.  E73588 CU.FT CU.YD.  E73588 CU.FT CU.YD.  AREA S D Q PR CAS.  AREA S D Q PR CAS.  AREA S D Q PR CAS.  CAL  15 Special Mandling Instructions and Additional Information Waste Profile Sheet Number(s)  a. E13568  c. d.  C. d.  16 GENERATOR'S CERTIFICATION: Thereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.  Printed/Typed Name  John F. Denham Envoirmental Linearer  John F. Denham Envoirmental Linearer  John F. Denham Envoirmental Linearer  John F. Denham Envoirmental Linearer  John F. Denham Envoirmental Linearer  John F. Johnson Linearer  John F. Johnson Linearer  John F. Johnson Linearer  John F. Johnson Linearer  Johnson Johnson Linearer  Johnson Johnson Linearer  Johnson Johnson Linearer  Johnson Linearer		ાર		Fixture, CKC	E,	0.0.1	D,T	5.68.20	P	u24 <b>2</b>
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J. Additional Descriptions for Materials Listed Above  d. FCF Conterinated Soil, Solid  b. c. d.  15. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)  a. E13568  c. d.  16. GENERATOR'S CERTIFICATION: Thereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.  Printed/Typed Name  John F. Donkam Envoirnmental Linearer  Manth Day V.  John F. Donkam Envoirnmental Linearer  Manth Day V.  17. Transporter 1 Acknowledgement of Receipt of Materials  Printed/Typed Name  Signature  Printed/Typed Name  Signature  Signature  Manth Day V.  O 6   2   6   8   8    Date  Printed/Typed Name  Printed/Typed Name  Signature  Signature  Manth Day V.  O 7.		c.							<del>                                     </del>	
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d.  16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.    Printed/Typed Name	1	а. Ь.		ste Profile Sheet I	Vumber(s)	ŭ	10.	اری ما مانمان	FIT	
shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.    Printed/Typed Name		d.	NETRALON'S CENTRICATION III					10-01		
Printed/Typed Name  John F. Denham Envernmental Marcer  17. Transporter 1 Acknowledgement of Receipt of Materials  Printed/Typed Name  Bill Marrison  18. Transporter 2 Acknowledgement of Receipt of Materials  Printed/Typed Name  Signature  Signature  Signature  Signature  Signature  Signature  Manth Day Ye  Date  Printed/Typed Name  Signature  Manth Day Ye  Annull Day Ye  Signature		10. GET ship	NEKATOR 5 CERTIFICATION: Thereby declare that the conte	ats at this consignment.						
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1	UNIFORM HAZARDOUS  WASTE MANIFEST  1. Generator's US EPA  WASTE MANIFEST  2. D. O. O. 9. 5	975431 00	Manifest coment No.	2. 7 of	ge I Informatinot requ	ion in thi	e shaded preas is ederal law.
	3. Generator's Name and Mailing Address		<del>&gt;</del> -	A 51	ate Manifest Docum	neat Num	ber
	Time Oil Co. 12005 H. Burgard Road Portland, Or 4 Generator's Phone (206) 285-2400	egon 97203		E. Sto	are Generator's ID		
	5. Transporter 1 Company Name 6.	US EPA ID Number	<del></del>	C. 51:	ate Transporter's IC	<b></b>	
		D050973	437	D. Tre	ansporter's Phone	(503	<u>) 255-7900</u>
	7. Transporter 2 Company Name 8.	US EPA ID Number	•		ite Transporter's ID		
I		US EPA ID Number		<del>ļ</del>	insporter's Phone	<del></del> -	
Ì	9. Designated Facility Name and Site Address 10.  Chem-Security Systems, Inc.	US EPA ID Number	•	G. 5%	ate Facility's ID		
	Star Route Arlington, Oregon 97812	ORD 089 452 3	5 <b>3</b>	1	cility's Phone 03-454-2643		
	11. US DOT Description (Including Proper Shipping Name, Hazard Class, and		12. Cont	ainers	13.	14.	EPA/L
ŀ	[HM]		No.	Туре	Total Quantity	Unit Wt/Vol	Waste No.
	Solid Maste Fentachlorophenol Mixt MA 2020 (RQ 10)	ure, CRM-E,	001	ŊΤ	54380	P	ns75
	b.						
	c.		<del> </del>				
	d.		<u> </u>				
	J. Additional Descriptions for Materials Listed Above		[v	У Нь VPS	nding Codes for W	rages to	ได้บ์ใช้มี.
	b. FCF Conteminated Soil, Solid c.	·	[ [	PEA	588		34100
	d.  15. Special Handling Instructions and Additional Information Waste Pro	file Sheet Number(	s)	-10	133 QC	-/ G	AL
	a. 1,13588 <b>b.</b>	•	•	_			
	c.				18~(		
	d	·					
	16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this shipping name and are classified, packed, marked, and labeled, and according to applicable international and national governmental regula	are in all respects in prop	d accurately o per condition	lescribe for tra	ed above by proper nsport by highway	ا	
	Printed/Typed Name	Signature /	12 10		· · · · · · · · · · · · · · · · · · ·		Date onth Day Year
	John F. Denham Envoirmmental Manager	Junio /	· Xle	n.k			.6 2.8 8.5
	17. Transporter 1 Acknowledgement of Receipt of Materials	101/-01	1		/		Date
	Printed/Typed Name	Sighature		1	1/2		onth Day Year ·6 2·8 5·5
ŀ	18 Transporter 2 Acknowledgement of Receipt of Materials	1 (1)		ر			Date
	Printed/Typed Name	Signature				Ме	onth Day Year
19. Discrepancy Indication Space TOLS010126							
				10	)LSU1012	.0	
	20. Facility Owner or Operator: Certification of receipt of hazardous materia	als covered by this manife	st except as r	noted in	item 19.		Date
	Printed/Typed Name	Signature	) P	0	~/~	Mo	onth Day Year
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TOLS010127

DATE	LOADED AT NW	UNLOADED AT CSS	CHANGE ENROUTE
6/25/85	25.14	25.22	08
6/25/85	27.16	27.05	+.11
6/25/85	26.85	26.83	+.02
6/26/85	26.92	26.96	04
6/26/85	27.64	27.71	07
6/26/85	26.64	27.14	50
6/28/85	27.13	27.36	23
6/28/85	28.14	27.95	+.19
6/28/85	<u>27.14</u>	27.08	+.06
Total Tons	242.76	243.30	
Average Tons	26.97	27.03	54

Nine truckloads shipped. Total quantity received at destination was within 1/2 ton of quantity loaded. Good show.



## TIME OIL COMPANY

2737 W. COMMODORE WAY, P.C. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

August 8, 1985

Environmental Emergency Services 4555 N. Channel Avenue P.O. Box 3320 Portland, OR 97208-3320

Dear Sirs:

Enclosed is check #24715 in the amount of \$500.00 as payment in full for services necessary to obtain and analyze three composite site surface samples, at Northwest Terminal as stated on your enclosed invoice dated 7/31/85.

Thank you.

Sincerely,

Colleen H. Hogle
Colleen H. Hogle

Enclosures a/s



### TIME OIL CO.

PIO BOX 24447 TERMINAL ANNEX SEATTLE WASHINGTON 98124

PAY TO THE ORDER OF

August 7, 1985

ENVIRONMENTAL EMERGENCY SERVICES

4555 N. CHANNEL AVENUE P.O. BOX 3320

PORTLAND, OR.

97208-3320

PROTECTED AMOUNT

\*\*\*\*\*\*\*\*\*500.00\*

AMOUNT \*\*\*\*\*\*\*\*500.00\*

BY\_\_\_\_

BY TWO SIGNATURES REQUIRED

#024715#

#102130B176#

30991597

TIME OIL CO.					24715		
INVOICE	REFERENCE NO.	TAUOMA	INVOICE	REFEREN	CE NO.	TNUOMA	
	Services necessar samples, at North	y to obtain and ana west Terminal.	lyze three	camposite	site sur	face	
P1 TAP 110 4/81			CHECK DATE	8-7-85 24715	DISCOUNT	\$500.00	<del></del>

WHEN DETACHED AND PAID, THIS CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE ITEMIZED ACCOUNT

### CHECK REDUEST

		DATE:_	August 1, 1985
		•	
ISSUE CHEC	K TO COVER THE FOLLOWING:	••	:
PAYEE:	Environmental Emergency Services	\$	500.00
	4555 N. Channel Avenue		
ADDRESS:	P.O. Box 3320		
	Portland, OR 97208-3320		
REASON FO	R FAYMENT:		
	necessary to obtain and analyze three co	omposite site s	urface samples. at
	t Terminal.		
	· ·	•	
REQUESTED	By. John P. Senham	CHARGE ACCO	UNI NO
KEGOTSIED		,	
PAYMENT SO	CHÉDULE CO		
YAGOT	(or)		
SPECIFY D	DATE August 6, 1985 X	-: '	•
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		;	
VOUCHER#_	· · · · · · · · · · · · · · · · · · ·		APPROVED

Please send check to Colleen. Thanks!!

RIEDEL ENVIRONMENTAL: SERV

STATEMENT

ENVIRONMENTAL EMERGENCY SERVICES CO. DIV P.O. BOX 3320. PORTLAND OR 97208-3320 (503) 285-9111

+ CUSTOMER NUMBER

:12315

TIME:OIL:CO: PaO:BOX:O3137. ST:JOHNS:STATION PORTLAND:OR:97203

STATEMENT DATE: :07-31-85 STATEMENT AMOUNT:\$500.00

LAST STATEMENT DATE : LAST STATEMENT AMOUNT:

12315 ACT DATE INVOICE # TYP REFERENCE INFORMATION JACTIVITY AMOUNT 07-24-8512037-7 [REG|8121 - 27526 500.00 1\*\*\* TOTAL STATEMENT AMOUNT \*\*\* 500.00 DIV.3 **HTUA** PRICE MO. REC/ DIST ATTACHED CURRENT ACTIVITY: 31-60 BALANCE: 61-90 BALANCE LOVER 90 BALANCE: FUTURE RET DUE 500.00 1 0.00 | 0.001 0.00

STATEMENT

# **KOPPERS**

Donald F. Marion Manager, Raw Materials Specialty Wood Chemicals Division

October 18, 1985

Time Oil Company
P. O. Box 03117
Portland, Oregon 97203

Attention: Neil Wallis Manager

Dear Neil:

On behalf of Koppers Company, Inc., Jim Garrity, Denise Burrell and myself, I would like to thank you for your hospitality during our visit to the Portland Terminal on October 9. I will circulate the pentachlorophenol sampling and analysis report prepared by Riedel Environmental Services to our people in Pittsburgh and will be in touch with you and Bob Abbendroth to set up a follow-up meeting in the near future.

Again, I sincerely appreciated the opportunity to meet with you and to bring me up to date on the pentachlorophenol situation at the Portland Terminal.

If I can be of service in any way, please do not hesitate to contact me immediately.

Sincerely yours,

Donald F. Marion

DFM/jls

cc: D. Burrell
J. F. Garrity

P1 -

### **EXPENDITURES**

7/10/85 Northwest Vacuum Truck Service	9000.00
7/29/85 Chem-Security Systems 242.76 TONS	27270.88
8/8/85 Environmental Emergency Services	500.00
12/5/85 Environmental Emergency Services Sources	18741.55 55512.43
	> \$584,0124=
Due:	
DEQ per OAR 340-102-065 - TAX	3500.00 Social +
Riedel Environmental Services (Amendment 2)	25000.00
Whatever is necessary to finish job	??

61





### TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 981/4 ...

Time oil - File

January 27, 1986

William J. Baldwin Koppers Company, Inc. 436 Seventh Avenue Pittsburgh, PA 15219

Dear Bill.

Enclosed is copy of the ATW Calweld data I promised on January 23, 1986 during our meeting at your Pittsburgh, PA offices. Calweld designed, developed and operates the equipment. ATW developed the waste treatment technology. Cary Jackson is the chemist who determines what is needed to treat whatever the problem, consistent with client desires. The proper person to contact is Franch Manchak. I have spoken with him. He has agreed to speak with you about our mutual problem.

Regarding the water treatment biodegradation process, the three basic chemicals are amonium nitrate, potassium sulfate and sodium phosphate. These fertilizer materials provide the chemical nutriants énabling bacteria to grow. Bacteria are added. The whole mixture is arable. Water is pumped from below ground to a surge tank to a 10' x 10' x 30' tank where the mixture exists. Discharge is either returned to the ground or to sewer as permitted.

Today I received the enclosed DEQ Hazardous Waste Enforcement Guidelines dated January 9, 1986. A copy is enclosed for your information. The thought I intend to convey here is related to our meeting discussion about the unknown amount of money (shown as a ?) on the "cost to date" paper presented. This is an unknown that I had no idea was in existance at the time of our meeting.

Hope this helps. It was a pleasure to see you again, to meet Dave and to provide a project status update.

John P. Denham

Environmental Manager

Enclosure a/s

cc: Robert Abendroth
Jim Garrity
Dave Kerschner
Don Marion
Templeton Smith

TOLS010135

K-64

000600

Koppers Company; ic.				
	UTING SLIP	1		
		TO STATE		
Dave Kerschner	K-1940			
PREPARE REPLY  POR MY SIGNATURE				
□ Note & Return	COMMENT & RETURN			
□ Note & File	TAKE APPROPRIATE ACTION			
REMARKS:				
After you review this, let's discuss.				
214-Due sending to J-Smith 3				
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W. J. Baldwin	2457		9/86	

TOLS010136

१९५३) इ.स.च्याच्या SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
SAN PEDRO
LOS ANGELES



### TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

January 27, 1986



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John P. Denham

Sincerelv

Environmental Manager

Enclosure a/s

cc: Robert Abendroth
Jim Garrity
Dave Kerschner
Don Marion
Templeton Smith

FAROOQ KAHN
Director of Engineering

11212 South Norwalk Blvd. Santa Fe Springs, CA 90670 Phone: (213) 863-9377 Telex: 69-8461



John F. Steinke President

11212 South Norwalk Blvd. Santa Fe Springs, CA 90670 Phone: (213) 863-9377 Telex: 69-8461



Program Management Laboratory Startup Environmental Analysis Gas Chromatography Mass Spectrometry Software Evaluation

Cary B. Jackson

3249 Silverthome Drive Fort Collins, Colorado 80526

303-226-3561

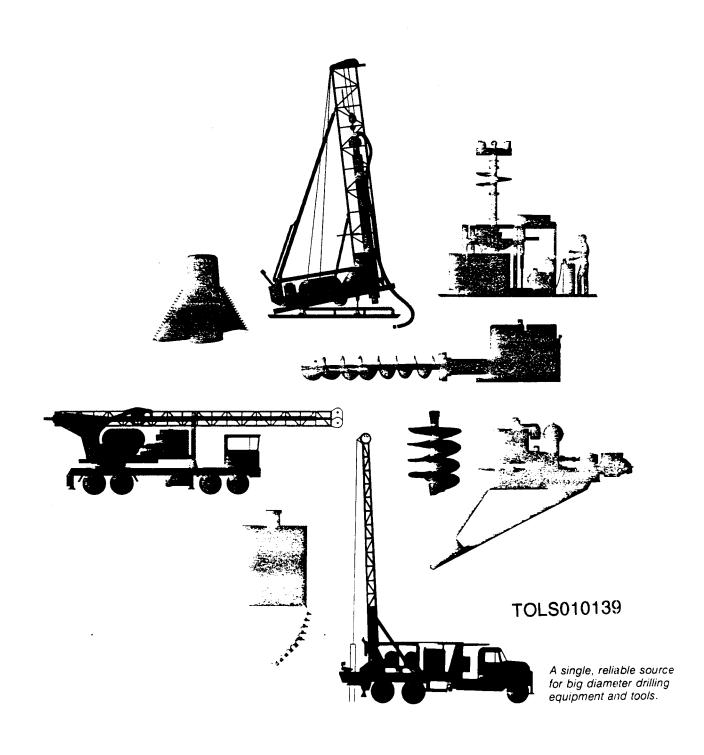


FRANK MANCHAK JR. PRESIDENT

11300 S. NORWALK BLVD. SANTA FÉ SPRINGS. CA 90670 (213) 929-8103 863-9377 TELEX 69-8461 TELEFAX (213) 929-3197

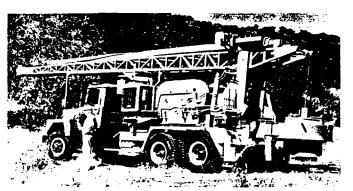


# A COMPLETE LINE OF STANDARD & CUSTOM ENGINEERED DESIGNS FOR LARGE DIAMETER DRILLING



# TRUCK MOUNTED **BUCKET RIGS**

These versatile Calweld drill rigs are truck mounted, completely self-contained. They're designed to move in, set-up in a matter of minutes, and drill fast, clean bores in most formations. Ideal for water and dewatering wells, foundations, conductor holes and cesspools, they can be used profitably for almost any large diameter drilling.



CALWELD offers the most complete line of models, types and capacities to meet any requirement!



### **HYDRAULIC DRIVE MODELS\***

MODEL 42LH Dia: 36" bucket to 84" with reamers Depths: to 96'

MODEL 45LH Dia: 42" bucket to 96" with reamers Depths: to 96

MODEL 52LH

Dia: 48" bucket to 120" with reamers Depths: to 96

MODEL 520LH Dia: 48" bucket to 132" with reamers Depths: to 120"

MODEL 5200LH Dia: 48" bucket to 144" with reamers Depths: to 170' VIEWER.



### MECHANICAL DRIVE MODELS:

MODEL 150C Dia: 36" bucket to 84" with reamers Depths: to 70°

MODEL 1750 Dia: 36 oucket to 84" with reamers Depths: to 85"

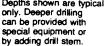
MODEL 200C Dia: 48" bucket to 120" with reamers Depths: to 85"

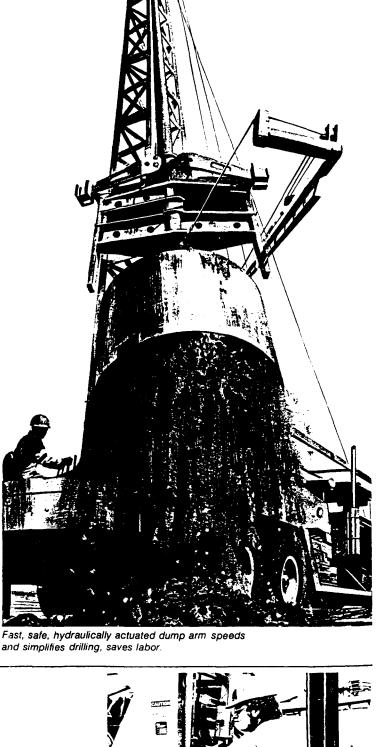
MODEL 250C Dia: 48" bucket to 132" with reamers

Depths: to 85

Depths shown are typical only. Deeper drilling can be provided with special equipment or

Standard equipment for all Calweld models includes hydraulic derrick positioning and dump-arm actuation. Optional features are hydraulic kelly crowd, rear outriggers, front leveling jack and direct or reverse circulation equipment. A full line of buckets and tools is also available.





and simplifies drilling, saves labor.

# **ALL HYDRAULIC** "POWER DRILLING"

1

Another full line of Calweld Bucket Drills offers smooth, powerful, all-hydraulic operation for maximum work capacity with minimum effort. A completely balanced hydraulic system, combined with heavy-duty hoists, allows precise control with automatic, pressure controlled braking under any power loss. Fully proven, they're safe and reliable. No chains, gears, sprockets or other moving parts are exposed.

> All hydraulic gauges, drilling and hoist controls are conveniently located





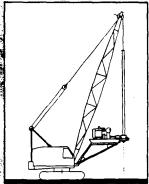
Convert any crane into a fast, efficient drilling rig with one of these compact Calweld units. It can be easily attached and removed, using the crane itself . . . and it adds another profitable function to existing crane investment. Self contained with its own power and sealed rotary drive, these versatile units save labor — let the crane operator perform high-speed auger drilling; deep or large diameter bucket drilling; and when fitted with circulation equipment can be used for extra-deep or rock socketing

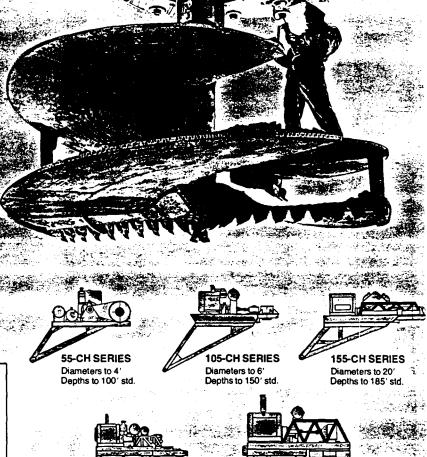


Modular design Calweld units allow the best combination of power unit, base and accessories for any formation.



Greater depths can be accomplished by adding special equipment and/or extended kelly bars.





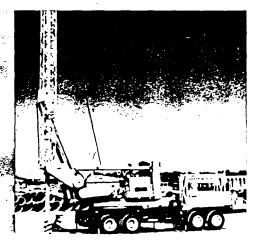
175-CH SERIES

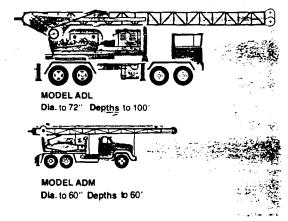
Diameters to 22' Depths to 185' std

### **AUGER RIGS**

These extra-heavy duty auger-type drills are designed specifically for relatively shallow, large diameter holes where their portability, easy hydraulic set-up and fast penetration can save time, labor and money.

Self contained with diesel power and smooth torqmatic transmission, the entire drill unit is truck mounted on a 270° turntable with a patented, hydraulically actuated house lock for fast, accurate positioning and spin off of spoil. Features include a sealed-in-oil rotary drive, hydraulic mast positioning, kelly crowd and optional outriggers.



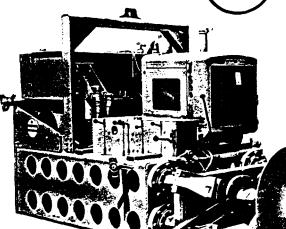


200-CH SERIES

Diameters 2' to 24' Depths to 185' std. (Twin diesel drive)

# HORIZONTAL BORING MACHINES







Using the powerful push of up to 600 tons, these horizontal drills are especially designed for straight, clean boring under streets, tracks, buildings or any other similar location — without disturbing traffic above. It offers an easy, economical way to run conduit, utility lines or even large diameter culverts.

Using a flight auger, the Calweld horizontal boring machine can work at speeds up to two feet per minute, drilling straight holes from 6" to 60" in diameter.

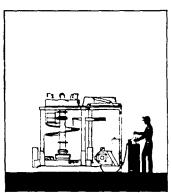
They can also hydraulically jack casing into the hole as they bore, to provide a fast, clean finished hole.



MODEL HB-600, Diameters to 60", bores to 300' horizontally, 600 tons push. (Not shown, Model HB-300, dia. 12" to 60", 300 tons push)

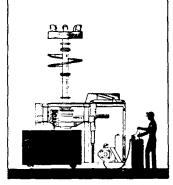
# VERTICAL THRUST BORER

Compact, lightweight and self-contained, this unique boring machine was developed for fast, clean boring of vertical raises from the bottom up. It's ideal for ventilation shafts, manways, ore passes and other underground openings, with no pilot hole needed to drill a hole up to 52" in diameter, and heights to 250 feet in a single pass! Any type of cutter can be used, depending on drilling conditions, and the unit can also jack casing into the finished hole.

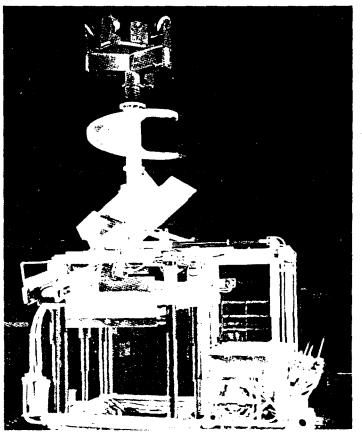


3

Ready to bore, the rotary table is at bottom position.



**Boring upwards**, hydraulic thrust pushes the entire rotary table and drill stem. Muck is conveyed to cars automatically.



# CIRCULATION DRILLING EQUIPMENT

Direct or reverse circulation drilling equipment, engineered specifically for large diameter, deep drilling, has been pioneered and perfected by Calweld over a number of years. Today, these proven designs are in use worldwide on standard and custom Calweld drill rigs. In addition to the three basic types shown below, Calweld can provide special circulation equipment including bits belling tools and air-lift drill pipe for any requirement.

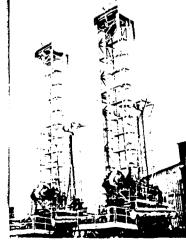


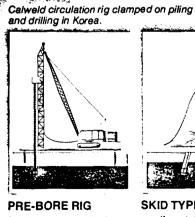
Pile top rigs can be furnished with derrick and pipe rack for self-contained operation.

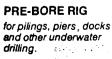


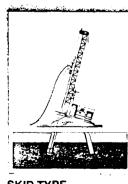
# 300 Best



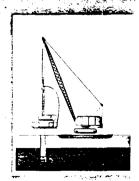








SKID TYPE a self-contained unit complete with mast, power package and rotary table.



PILE RIG
mounts right on the
casing and requires a
separate crane to handle
the drill string.

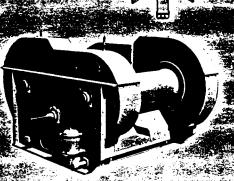
# CALVELO CUSTOM EQUIPMENT FOR SPECIALIZED APPLICATIONS

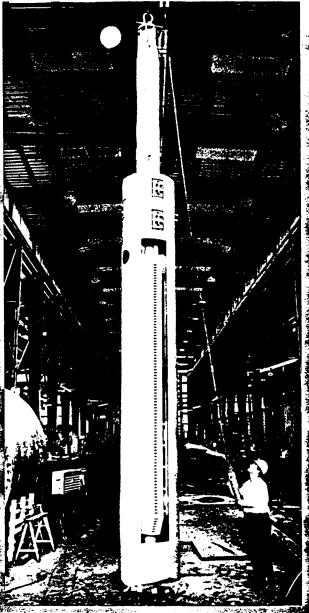
In addition to many types and models of large diameter drilling and boring equipment shown in this brochure, Calweld has the capability to modify these designs for your special requirements, or to engineer and build a completely custom design to virtually any need.

Drawing from a wealth of experience and engineering background in this special field, Calweld can handle your complete drilling equipment requirements from a single, reliable source. Complete engineering design, manufacturing and testing facilities are available, and Calweld's practical experience can save you time and money on both custom and standard equipment.

### HEAVY DUTY HOISTS

A complete line of Calweld designed and built hoists is available as part of Calweld rigs or separately for all general-purpose applications. Mechanical and hydraulic, single and double drum units to 44,000 lbs line pull

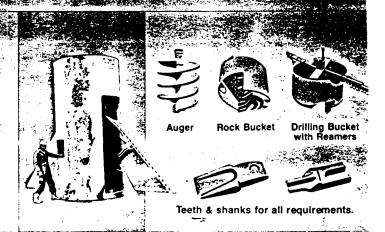




This custom Calweld tool drills 36 inch diameter holes, and bells up to 15 feet in diameter using expanding arms. It features an 8 reverse circulating system for removing cuttings.

# COMPLETE LINE OF DRILLING TOOLS & CUTTERS

Calweld drilling tools for all formations and type of drilling include augers, buckets, belling tools, reamers, chopping buckets, rock buckets and all types of teeth and shanks. Custom tools can be furnished for special requirements.



BULLETIN NO. 79-101-3M

D 11212 S. Norwalk Blvd., Santa Fe Spring

11212 S. Norwalk Blvd., Santa Fe Springs, CA 90670 / Phone(213) 863-9377 / Telex: 69-8461

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### STANDARD NON-DISCLOSURE AGREEMENT

PURPOSE: To evaluate methods and technologies for the abatement and management of hazardous and difficult to manage waste.

### Gentlemen:

865

We are supplying certain Technical Information to you and will, from time to time, supply additional Technical Information which may include, but is not limited to, plans, specifications, flow charts and drawings (hereinafter referred to as Technical Information) to be used by you for the purpose described in the heading.

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DISCLOSER

RECIPIENT

By;

Its;

# Wast Plant of Rollins Environmental Is Closed by Louisiana After Inspection

By Thomas Petzinger Jr. And Alix M. Freedman

Staff Reporters of THE WALL STREET JOURNAL
Louisiana officials said they ordered
one of the nation's largest and most troublesome commercial hazardous waste operations permanently closed after an incinerator at the site apparently ran out of
control.

The order against the operator, Rollins Environmental Services Inc., of Wilmington, Del., followed an inspection Monday night during which three state regulators found strong odors drifting from the Baton Rouge plant and a thick plume of black smoke pouring from the incinerator, which breaks down hazardous, chemically complex materials.

The inspectors also found that workers in the plant's control room were in a state of confusion and that one of the operators was suffering from dizziness, according to Joy Bartholomew, Louisiana's deputy secretary of environmental quality.

The incident was the latest in a long series of problems at the plant, whose odors and suspected groundwater contamination have aroused great controversy in this chemical-industry capital. "We haven't been able to get them to be good neighbors," Ms. Bartholomew said yesterday. "The site is a detriment to the state and we had no choice but to order them to cut their losses."

Thomas R. Blank, a spokesman for Rollins, termed the state's action "certainly a surprise." He said new air emissions equipment was added to the site's incinerator last year, making the incinerator one of "the best in the world."

In addition, inspections of the site over the "last several months" had uncovered no violations, he said. "The regulatory compliance of the company has been excellent."

The order, imposed yesterday, required that Rollins immediately close the incinerator pending further state inspection and that it file, within 30 days, a plan for the permament closing of the site within six months. The order added that the state was considering whether to impose fines against Rollins.

In addition to incinerating chemicals, Rollins buries wastes in a landfill at the site, which Louisiana officials say ranks as the second largest active hazardous waste land disposal operation in the U.S. The inspectors also found that, in violation of Rollins's permit, there were strong odors at the landfill and at a biological-reaction basin at the site.

"The smell would have gagged a maggot," said Stephen Irving, a lawyer here representing a class of 1,100 plaintiffs in a pending \$1 billion lawsuit against Rollins, including a congregation that claimed it had to relocate its church because of strong, intermittent odors. Mr. Irving said Monday night's emissions interfered with a

revival at another church that is also suing Rollins.

Mr. Blank, the company spokesman, said it was "too early to determine" the effect of the state's action on Rollins's business. "There is no accurate way to make an assessment."

Rollins operates three disposal and waste facilities in Bridgeport, N.J., Deer Park, Texas, and Baton Rouge. The company also has a deep injection well in Plaquemine, La. The largest revenue producer for the company is the Deer Park operation, Mr. Blank said. He wouldn't disclose the revenue the Baton Rouge facility generates. Last year, Rollins earned \$6.5 million on sales of \$69.4 million.

The intended closing of the landfill and incinerator operation may solve one problem but create another major one: What to do with all the toxic refinery byproducts that Rollins has been disposing of for its local and out-of-state petrochemical customers? "We are going to work very closely with Rollins and their clients to find alternate means of disposal," Ms. Bartholomew said. But she acknowledged that "it will be a long process."

Mr. Blank said that Rollins's senior management, including Darrell M. Trent, chairman and chief executive officer, were in Baton Rouge to "investigate exactly what has occurred and the validity of the state's allegations." Rollins expects meetings with regulators soon, he added, "but how long it will take to resolve the problem, we can't say."

The spokesman emphasized that although the incinerator is shut, the land disposal and chemical and biological treatment operations now remain open. Rollins doesn't expect any immediate buildup of waste or disruption of service. The company is allowed to store wastes on its sites for a certain period of time, so there will be "no immediate interruption of service to customers," Mr. Blank said.

The action against Rollins may signify a tough, new stance against hazardous waste disposers in Louisiana, a state long held out by environmentalists and by some federal officials as one of the most lackadaisical toward polluters. State regulators said yesterday that the office of Gov. Edwin Edwards, a strong defender of the chemical and waste disposal industries, had been informed of the Rollins order and didn't interfere with it.

Other state officials attributed the state move to growing citizen outrage at air and water contamination. "The pressure from the public finally led the state to take some action," said Willie Fontenot, a member of the state attorney general's staff.

Among the most vocal critics has been Mary McCastle, a Baton Rouge housewife who lives near the plant and who claims that she acquired emphysema from inhaling its emissions. "These smells are the worse thing I've lived through in my 67 years," she said.

# Pressure Builds for Cleanup of Closed Plants

### New Jersey Pollution Law Stirs Interest in Other States

By BARRY MEIER

Staff Reporter of The WALL STREET JOURNAL Closing a factory may take longer than opening one—as Witco Chemical Corp. has discovered. The company has lined up a buyer for a chemical plant in New Jersey that ceased operations in 1983, but the state has blocked the sale until Witco as-sures that any pollution on the property will be cleaned up.

As more and more manufacturing plants in the nation's troubled basic industries shut down, many end up on the list of America's most polluted sites—and the number is expected to grow. Meantime, legal pressures are building to prevent companies from simply locking plant gates and leaving behind dangerously polluted land and water

The cost of cleaning up a single contaminated plant can easily run into millions of dollars, with the expense growing the longer hazardous chemicals are allowed to

"Because costs are high and cleanups can take a long time," there is a big incentive for companies to walk away from pollution problems at closed plants, says John Skinner, director of solid waste for the U.S. Environmental Protection Agency.

Cleanup bills are adding significantly to the cost of closing a plant. Ford Motor Co. recently agreed to pay at least \$4.3 million to remedy groundwater contamination and other pollution at a car assembly plant in Mahwah, N.J., that was closed in 1981. Estimates of cleanup costs stemming from the closure of Allied Corp. chemical plants in Baltimore and Syracuse, N.Y., are in the "millions of dollars," Allied says. "Companies are much more concerned

today about avoiding future liabilities" from toxic substances at closed plants, says H. Richard Seibert, vice preside resources and technology for the National Association of Manufacturers. Mr. Seibert also thinks cleanup costs at such plants will rise, particularly for those where toxic-waste disposal units were operated. Federal restrictions on plant closings

apply only to sites that accepted hazardous wastes after July 1982. But factory pollution also can come from other sources that, strictly speaking, aren't wastes. These sources include leaking tanks of solvents, defective production equipment and improperly handled cargo.

New Jersey has taken a broader approach to the problem. Under a 1983 law that is more sweeping than older hazard-ous-waste laws, the transfer or sale of any industrial facility that used or stored hazardous substances can be barred until the wner presents a cleanup plan and ensures that its costs will be met.

The law puts cleanup costs "where they belong rather than on an unsuspecting pur-chaser who might end up with an albatross around their neck," says Raymond J. Lesniak, a New Jersey state senator who wrote the law.

Similar legislation is pending in Mary land, where it has been defeated twice. Officials in New York and Pennsylvania, too, are following developments in New Jersey with an eye to introducing similar legisla

The New Jersey law was prompted by the discovery in 1983 of high levels of the toxic chemical dioxin at a former Diamond Shamrock Corp. herbicide plant in Newark. Keith A. Onsdorff, a former state environmental official who is now with the EPA, says the company was "clearly aware" of the pollution problem.

"They had left the site in a very con-taminated state," says Mr. Onsdorff. Under consent agreements with the state, Di-amond Shamrock, a Dallas oil and chemical company, has agreed to pay \$22 million to decontaminate the plant and the residential neighborhood nearby. The com-pany says it learned of the problem only after environmental authorities did in

The power to ban the sale of contami-nated industrial property is quickening the pace of factory cleanups in New Jersey,

**NEW JERSEY** Alaw, which other states may copy, prohibits the sale of polluted industrial propertyuntiltheowner agrees to clean it up.

say state officials. For example, talks between environmental regulators and Ford officials dragged on for nearly two years after the discovery of groundwater con-tamination at the Mahwah plant in 1982, says Anthony J. McMahon, an official of the state's Department of Environmental Protection who oversees enforcement of

But just a few months after Ford found a buyer for the site, a cleanup plan was in hand, Mr. McMahon adds. James M. Reinke, a Ford environmental control manager, says the law "brought every-thing to a head because of the problem of selling the property until the plan was ap-

Under its agreement with the state, Ford must pay \$500,000 a year to operate equipment to purify the tainted groundwater. Mr. Reinke says it isn't known how long the job will take.

Other major payments extracted under the New Jersey law include \$4.2 million from Texaco Inc. and Coastal Corp. to clean up petroleum spills at a Texaco oil refinery sold to Coastal in May. Mr. McMahon estimates that the law's annual cost to New Jersey industry eventually may reach \$100 million.

The cost of cleaning up the Witco plant, which produced metal-plating chemicals in Berkeley Heights, N.J., isn't known. Witco savs it hasn't vet filed a cleanup plan because it is still investigating the extent of

any contamination. Meanwhile, arrangements to sell the plant are in says Alan M. Abrams, vice president and general counsel of the New York-based chemical company.

The cost of complying with the law has drawn criticism. Hal Bozarth, executive director of the New Jersey Chemical Indus-Council, a trade group, says cleanup standards are unrealistically strict.
"You'll never be able to get the land back to where it was when the Indians sold it.' says Mr. Bozarth.

Others contend that the law will cause companies to steer clear of New Jersey when deciding where to locate new facto-ries. "We just won't ever open a plant in New Jersey again," declares the head of one of the state's major manufacturing

Still, with the threat of similar cleanup laws in other states, some companies are conducting their own inspections of plants that may be closed. In the past three years, Monsanto Co., a St. Louis-based chemical company, has sent engineers to its plants to test the soil and water for toxic chemicals.

Monsanto says it found contamination at three plants it closed during that period and took steps to correct it, including de-contaminating groundwater and digging up and removing wastes. The plants are in Eugene, Ore., Santa Clara, Calif., and Re-

search Triangle Park, N.C.
"The earlier we identify these problems, the cheaper it will be to clean them up," says Morton L. Mullins, Monsanto's director of hazardous wastes. Company investigators use a grid to map a plant site. Samples from each section of the grid are tested, with the results forming a record of any pollution. The information is used to inform prospective buyers of the property, as well as to protect Monsanto should it later be accused of pollution it didn't cre-

Concern is growing among government environmental officials, however, that environmental officials, however, that smaller companies may have neither the resources nor, in some instances, the inclination to face contamination problems when they close plants.

For instance, recent federal rules limiting use of pentachlorophenol, a wood preservative, are expected to drive many small wood-treatment companies out of business, says Douglas Mundrick, a haz-ardous-waste official with the EPA's Atlanta office.

'If they file for bankruptcy, there is really nothing we can do," to force a com-pany to clean up a polluted site, says Mr. Mundrick. The burden then may fall on public funds.

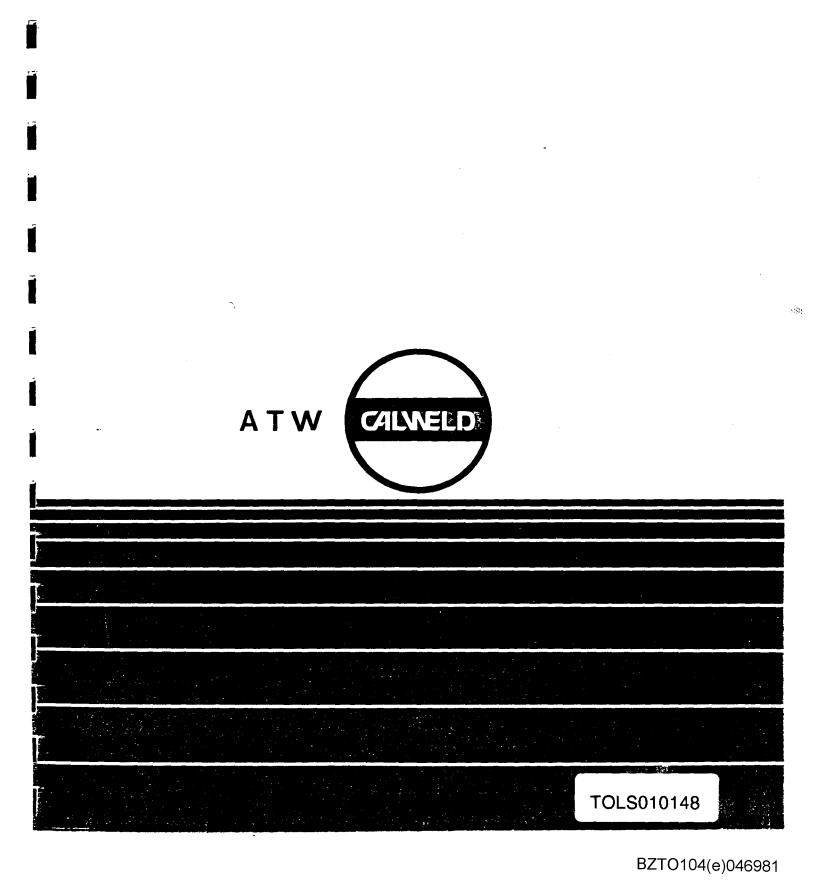
Moreover, says Mr. Mullins of Mon-santo, as cleanup costs rise, some companies may choose what he calls the "perpet-ual care option" rather than sell a plant and risk triggering a cleanup. Pollution at an old plant might be allowed to fester until it endangers public health.

Indeed, at least one industrialist says that rather than subject his company to costs of complying with the New Jersey law, it may staff a closed plant with a skeleton crew. "Instead of selling a plant, we'll find somebody's idiot nephew to act

as a caretaker." he says.

Already there is evidence that many closed industrial sites throughout the nation may be dangerously polluted. Jerome P. Epstein, president of Perry Equipment Co., a closely held Hainesport, N.J., con-cern that buys and sells used factory equipment and real estate, says he was re cently asked to buy a closed chemical plant in Massachusetts

Studies of the property, which Mr. Epstein declined to identify, brought to light extensive groundwater contamination, he says. Because the owners wouldn't pay for a cleanup, Mr. Epstein adds, he had to walk away from the deal. "I didn't want to buy a Love Canal," he says



A T W -CALWELD

ALTERNATIVE TECHNOLOGIES FOR THE MANAGEMENT AND ABATEMENT OF IMPOUNDED HAZARDOUS WASTE.

UNITED STATES AND FOREIGN PATENTS FOR THE METHODS AND PROCESSES SHOWN OR DESCRIBED HEREIN HAVE BEEN ISSUED OR ARE PENDING.

### IN-SITU REMEDIATION OF IMPOUNDED HAZARDOUS WASTE

**TECHNOLOGIES** 

IN-SITU REMEDIATION TECHNOLOGIES
AQUISITION OF SUBSURFACE FEATURES
AQUISITION OF SUBSURFACE CONTAMINANT CHARACTERIZATION
CHEMICAL DETOXIFICATION
BIODEGRADATION
IN-PLACE PLASMA ENERGY
VITRIFICATION

**APPLICATIONS** 

HAZARDOUS WASTE SITES
BIO-RECLAMATION OF CONTAMINATED GROUND WATER
URANIUM TAILINGS AND LOW-LEVEL RADWASTES
OFF-SHORE HAZARDOUS SEDIMENTS
LOAD-BEARING AND CONTAINMENT WALLS

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### REMEDIATION BY IN-SITU TECHNOLOGIES

Technologies provide for a cost and environmentally-effective strategy for the insitu (inplace) detoxification of impounded and buried toxic hazardous waste. The apparatus consists of a mobile carrier equiped with a process tower, which contains an assembly of drill bits connected to hollow kellys. The manually operated or remotely controlled carrier traverses along a designated pathway on the surface of the waste impoundment. The rotating bits and kelly assembly is powered into the subsurface of the impoundment.

The rotation action of the assembly cuts, mixes and pulverizes the aqueous or semi-solid or dry subsurface contents or contaminated soil or a combination thereof, within a singular block. The selected dry, liquid or slurried detoxification chemical reagents or additives, are simultaneously fed and integrated at programmed feed rates, with the conditioned and homogenized subsurface waste contents therein, for contaminant detoxification and/or solidification.

The in-situ apparatus is a versatile subsurface treatment tool, providing site specific treatment processes and applications.

The technology provides cost-effective remediation to subsurface contamination problems by direct-treating the problem inplace, an extreme improvement over other costly and environmentally non-effective options that only contain the problem or relocate it elsewhere.

The health of remediation workers and the surrounding environment is protected by a shroud which contains the treatment area and which collects and scrubs any vapors, gases or fumes released from the subsurface contents during the conditioning and treatment stages.

### SUBSURFACE PHYSICAL FEATURES ACQUISITION

Prior to the intrusion of the bits and kelly assembly into the subsurface of a waste impoundment, a graphic picture of the physical subsurface features is acquired by the use of a combination of ground-penetrating radar, magnetometry devices, and suitable techniques to facilitate interpretation of the collected survey data.

A portable microprocessor based, digital-data recorder is incorporated to record the outputs of magnetometer and electromagnetic induction sensors. This capability allows the surveyor to collect data as rapidly as the site can be traversed along the desired grid, on the surface of an impoundment.

The systems graphically record such data as soil stratas, wet pockets, large voids (puff gas pockets), bedrock, boulders, buried concrete debri, pipes, cables, steel drums and other metal objects.

The acquired data which includes the location and depths of such object and conditions are stored in memory banks for recall and reference during the conditioning phase of the subsurface contents.

Such known objects may be exhumated, or melted through by the introduction and reaction of a plasma torch reaction, causing the objects within the selected treatment block to be vitrified, eliminating further treatment.

### SUBSURFACE CONTAMINANT CHARACTERIZATION

Experience has shown that quantative restoration goals and/or criteria need to be established before a remedial action of impounded waste sites are selected and implemented. The optimal concentrations of subsurface contaminants are critical to the insitu treatment and the detoxification of such contaminants. Improper levels of contaminants may waste expensive treatment and detoxification materials and result in poor product quality.

Prior to and during the subsurface conditioning and treatment of the toxic waste contents, characterization of the waste and contaminants, their optimal concentrations, their physical properties and their chemical or physical changing events must be understood and verified in a near real-time environment. To conduct these necessary characterization tasks, a wide range of subsurface data on a near-real-time basis must be acquired.

Until recently, only physical measurements such as temperature and PH could be monitored in near-real-time environment. Now subsurface analytes samples and data which may require dilution, concentration, clean-up and/or derivatization prior to detection, are determined rapidly by employing the principals of the herein described subsurface acquisition and analytical devices.

To acquire such subsurface data, a series of probes, sensors and sampling snorkel tubes are positioned at suitable locations on the intrusion bit and kelly assemblies and the process tower shroud assembly.

These data collection tools are interfaced with a microcomputer, which is integral to the system and serves to control, monitor, perform calibration, reduce data, generate reports, create running statistical evaluations, store data, mediate closed-loop control, validate data and provide communications to other computers, which select optimal subsurface treatment menus, dosage rates and treatment cycles. The rapid operating response available under such described subsurface acquisition and analyzing conditions provides a vehicle to monitor and analyze critical contaminant levels at very near-real-time. The response from such acquisition analysis vehicles may vary from a few seconds to five minutes or more.

The analyzing technique can address the determinations of a diversity of subsurface analytes from parts per million (PPM) to percent levels in both simple and complex waste matrices.

While the bit and kelly assemblies are penetrated into, or withdrawn from the subsurface contents during the conditioning or treatment phases, the sensors and probes continuously or intermittenly transmit data signals to appropriate monitoring, screening, analytical and reporting devices.

Removal Of Toxic Metals

Removal of toxic metals from waste streams by absorption and co-precipitation depends largely on chemically treatment processes that isolate and remove the elements of the contaminants from such stream.

To describe and predict the fate of these substances in treatment systems requires a fundamental understanding of the mechanisms controlling the chemical reactions in which they participate. It therefore is important to understand the physical and chemical behavior of a wide variety of toxic metals in a heterogeneous aqueous environment.

The potential of the processes is to treat these contaminants by the absorption of their elements on available or designed oxide surfaces or sites. It is also important to understand the chemical behavior of various complex elements of which by the chemistry of their complex compete for both the available, or those oxide surfaces or sites provided for by design. The lack of sites present therein or the failure in the design to provide adequate surfaces or sites result in what is commonly referred to as element interferences, the principal reaction being one of element re-solubility. The basic relationships of some of the re-solubility mechanisms are generally illustrated on the solubility chart shown.

Removal of potentially toxic contaminants from waste streams by absorption onto oxide sites is technically feasible and costeffective. Removal is primarily a function of PH, though other factors, such as surface-absorbent concentrations, and the concentration of other ions constantly being generated on demand to prevent re-solubility of such contaminants plays a vital role.

Some of the ATW proprietary reagents are proven and are the preferred mechanism in providing ion generation on demand to prevent element solubility, and further to control and reduce undetected and 'non-captive' elements. These reagents are discussed herein.

The removal of both cations and anions from waste streams in the manner discussed are adaptable to a wide range of process flow sheets.

Process Definitions

Chemical stabilization is defined as any treatment which modifies or improves toxic species present in a waste stream, by their detoxification, destruction, reduction, oxidation or immobilization to prevent their release into the environment.

Chemical Fixation

Fixation is defined as a form of physical treatment, by the addition to a waste stream of one or more materials being either chemical or inert, the results being a solid mass or a dry earth-like product having improved friability, non-permeability and structural integrity.

The ATW Process

The process is a combined chemical stabilization and fixation technology, which is achieved simultaneously or in a single process stage.

Chemical Stabilization

The ATW stabilization process renders soluble toxic species present in a waste stream, into an insoluble state by the chemical reduction, oxidation, destruction, detoxification or immobilization of those toxic species.

Chemical Fixation

The ATW fixation process by the integration of chemical cementing reagents, transforms the stabilized waste residue into a friable earth-like product or into a solidified mass.

TOLS010158

### THE CHEMISTRY OF HAZARDOUS WASTE TREATMENT

Wastes and waste streams may contain a wide range of hazardous soluble toxic constituents being in varying concentration levels. Such toxic species must be rendered inert or insoluble to prevent their release into the environment.

Some of the following chemical, physical or biodegradation processes must be undertaken to assure the detoxification, destruction or immobilization of those soluble constituents which may consist of toxic metals, organics, biological matter or varying levels of radioactive materials.

The following is a brief description of some stabilization processes for the environmentally-safe rendering of a variety of toxic species;

#### Neutralization

This is a treatment technique for acid or alkaline hazardous waste. The process of neutralization is the interaction of an acid with an alkaline (or base) for the purpose of PH adjustment. The products of neutralization processes are usually water and a salt.

Waste streams which may be treated are sulfuric or hydrochloric acid and pickle liquor from steel cleaning, alkaline or acidic metal-plating wastes, spent acid catalysts, acid sludges and residues from petrochemical industry and leather tanning.

Neutralization is a basic and a reliable process for treating hazardous wastes with a minimal risks to the environment.

### Precipitation

This is a chemical process for removing dissolved components from a waste by altering the equilibrium relationships affecting the solubility of the components. The process involves the removal of toxic metals from electroplating waste, and from wastes generated by the iron, steel and copper industries. Such metals may be cadmium, chromium and nickel.

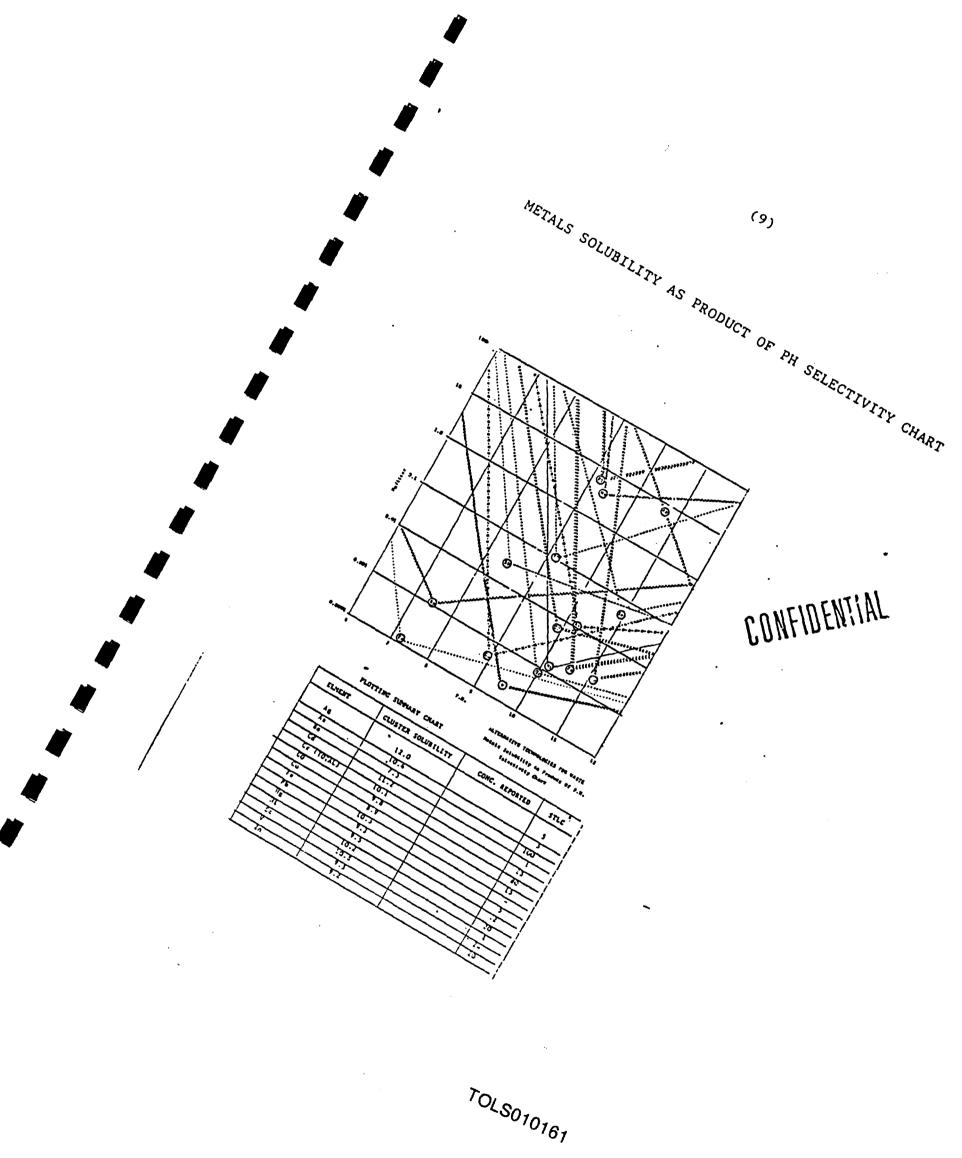
### Chemical Oxidation/Reduction

This process uses a chemical reaction to detoxify hazardous wastes. The reaction which occours is among the most common chemical reactions. Electrons are transferred from one reactant to the other, and in the process chemical bonds may be broken, converting a toxic material into  $\frac{1}{12}$  simpler non-toxic elements.

Both organic and inorganic wastes can be treated by chemical oxidation. Example of wastes constituents which can be treated by chemical oxidation include cyanides, sulfur compounds, lead, pesticides, phenolics, aldehydes and aromatic hydrocarbons.

### Saponification Of Oils And Greases

Oils and greases present in a waste stream are hydrolyzed in the presence of G-B and C-12 reagents, basic to alkaline solutions and the presence of heat generated from the slaking and hydration of lime compounds. The further presence of sodium and potassium salt residues of fatty acids cause the formation of soap, however metals present in the waste stream are transformed into insoluble metallic soaps or stearates, among them being lead and zinc stearates, others being cadmium and copper soaps.



Process Reagents And Additives Selection

Waste liquid and solid fractions are typically contaminated by objectional quantities of organic matter, salts, acids, oils, greases, sulfites, sulfates and fine silts, which could contribute to the interference of the stabilization functions and to the structural and chemical deterioration of the solidified mass or physically improved product. The selection of waste:specific process reagents and additives are therefore vital.

Through a wide range of bench testing and actual field applications, some of the following off-shelf and proprietary reagents and additives are typically identified with the ATW processes,

Off-Shelf Reagents And Additives

Calcium Oxide - Calcium Chloride - Calcium Sulfate Copper (II) Sulfate - Magnesium Oxide, Perchlorate and
Sulfate - Ferric Oxides - Potassium Carbonate, Hydroxide and
Permanganate - Sodium Sulfate, Hydroxide, Hydrosulfite and
Borohydride - Calcium Hydride - Lithium Aluminium Hydride Phosphorus Pentoxide - Sulfuric Acid - Nickle Boride Hydrogen Peroxide - Citric Acid - Formaline.

Off-Shelf Matrix Additives

Selected and modified clays and minerals for use as surfactants, element sites and absorption.

Organic humus for the sorption of selected chlorinated hydrocarbon pesticides.

Selected and modified surfactants for floc-waste dewatering conditioning.

Standard and sodium betonite.

Flyash, Cement Flue Dust, Disgarded filter media and activated carbons.

Proprietary Reagents And Additives

The following proprietary reagents and additives are in various stages of patent application, or agreement stages for exclusive use or manufacture,

Gator-Buffer (GB)

This buffer reagent is formulated to give-off and continue to release the (OH<sup>-</sup>) ion as is demanded for the maintaining of a selected PH-value within the treated product during and after treatment, preventing the resolubility of precipitated elements. The release as is demanded continues until the stabilization reactions and functions are completed.

Oxidation Reagent C-12, SulfX, IRAX

The very low toxicity of this reagent and ease of use, provides a versatile and effective tool in a complete process system. Some of the reactions and functions of this reagent are as follows,

- The reactions do not combine with phenols, but effectively break-down the benzene ring structure.
- Soluble iron and manganese are oxidized to particular matter.
- Sulphide compounds are detoxified upon contact, the molecule is broken down to H<sub>2</sub> and elemental sulfur, H<sub>2</sub>S generation is totally eliminated.
- Phenolic compounds, aldehydes, ketones and mercaptans are oxidized.

- Amino acids, especially sulfur containing and those that are aromatic such as tyrosine, are reacted and oxidized, whereas the disulfide bonds are broken-up, thereby altering the result of its specific function.
- The mechanism of the reagent also acts as a bactericide by principally an oxidation reaction, and not a chlorination reaction.

#### Inorganic Polymers

Chemical bonding is uniquely achieved by this highly versatile additive, on which improved mechanism of cement reactions was developed. The additive contains certain unique combinations of compounds which highly improve the bonding properties and cross linking abilities of the macromolecules, to produce advanced inorganic polymers with a wide range of uses for the microencapsulation of toxic substances.

#### Toxic Elements Reduction And Disassociation

This method involves the PH-value racking of the toxic organic and chlorinated hydrocarbon elements in an oxidation mode involving the use of G-B, C-12 and sulfuric acid concentrate. The elements are subjected to rapidly accelerated PH variations within a programmed time-frame and controlled oxidation, PH and temperature reactions.

A typically designed rack of PH variations, spikes the subject substance to PH variations ranging from 2 to 13 and than to basic. This is all achieved within a 'completed reaction time-frame'. The mechanism maybe repeated or reversed, subject to the complex and concentrations levels of the toxic substances. The disassociation of elements or the reduction of the elements to a lesser hazardous state along with a typical aqueous residue is fixed or solidified for disposal or in-place management.

The In-situ Waste Impoundment Treatment Technology

The now developed in-situ system inconjuction with the use of the various process reagents and additives described herein is highly adaptable for the chemical stabilization and solidification of a wide range of hazardous waste impoundments. The environmental and cost-effective advantages of this technology, eliminates the un-safe and costly 'mining' and removal and transporting of future impounded waste. The costly disposal of such hazardous waste materials into non-available suitable landfills are also eliminated.

The stabilization chemistry described herein renders the impounded toxic species insoluble or inert or, renders such species less hazardous.

The structural strength of the impounded waste within hours after treatment have improved shear and bearing values with decreased permeability, by the use of such described additives as selected clays, unslaked lime and inorganic polymers.

Impounded waste are not removed or surfaced during treatment. The unique intrusion component mixes, homogenizes, feeds and intergrates waste: specific chemistry with the waste. The countered-opposing blades of the intrusion component compacts the treated waste in-place during treatment.

The impounded waste are improved for removal or solidified for in-place management.

- Impounded aqueous wastes are chemically dewatered by exothermic reaction.
- Increase in structural strength and reduction of permeability are caused by flocculation and partly by reduction of water content.

- Required clay contents present in the waste or added to the waste by design, need not exceed 20% by weight of the wastes solid fractions.

The attached Chart (A) illustrates the increase of shear strength with time. Chart (B) illustrates the increase in strength approximately fifty (50) days after treatment.

Slurry Wall Construction

The unique capabilities of the insitu system and the solidification properties of the additives described herein, provide a wide range of unique and cost-effective advantages, over the traditional state of the art of slurry wall construction.

Some of the advantages are, that subsurface soils are not removed. That the system effectively cuts, stators, mixes and feeds the selected solidification additives in wet, dry or slurry form, which are intensly intergrated with the subsurface materials. That the subsurface materials may be of a variety of classifications ranging from organic silts, marine clays, clayey mucks, fractures sand stones or fractured clay gravel consolidates.

The use of the selected additives as mentioned herein for the construction of slurry walls can be supplemented by traditional additives such as betonite, cement or a wide range of such materials, or such materials can be used in lieu of the selected additives described.

The Mechanism Of Lime And Selected Clays

The mechanism of lime and clay reactions is one of the oldest technologies known to man; for example, it was extensively used in building the pyramids of Egypt. The Romans used it in a variety of ways. Until the growth of the chemical process industries at the turn of the twentieth century, lime was regarded almost entirely as a building and agricultural material.

The mechanism of lime and clay stabilization is described by the exchange of ions between calcium, sodium and hydrogen on the surface of clay particles. The ion exchange is an immediate reaction in which the larger calcium (Ca++) ions from the lime replace the larger Hydrogen (H+) and Sodium (Na+) ions. The Cation Sodium (Na+) is highly undesirable in clay soils as it can contain 79 molecules of water. There is an obvious highly desirable advantage in replacing it with Calcium (Ca++) which can retain only 2 molecules of water.

Lime therefore, changes a clay material from a hydrophylic to a hydrophobic condition, allowing release of bound moisture to evaporation. This partly accounts for the so called 'fast drying' action when lime is applied to wet mixtures of clays and aqueous residues.

Formation of complex silicates occour within the clay lattice at varying rates and is responsible for the marked reduction in permeability and increase in strength gain due to cementation of the combined mass.

Generation of exothermic heat occours during the use of unslaked calcium oxide for wet stabilization. Temperatures may exceed 212 degrees F., however temperatures are dosage related. For example one ton of calcium oxide is sufficient to heat 3.4 tons of water from 70 to 210 degrees F.

Calcium Oxide when slaked with moisture, the resulting product is calcium hydroxide or hydrated lime. The product draws carbon dioxide from the atmosphere and reverts back to limestone. This reaction or cycle is known as the lime-cycle. The use of the lime-cycle is applied in many industries to recycle lime so that it can be used over and over again.

In the ATW process the same lime-cycle is used and the lime cycle transforms the combined mixture of waste residue, clays and calcium oxide into a limestone product, by the presence of sufficient clays and free lime.

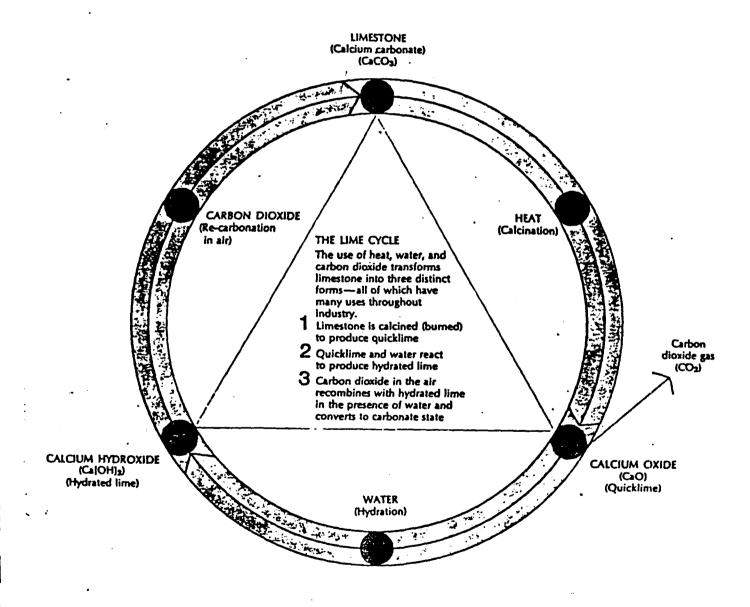
The standard procedure for the conversion of limestone to calcium oxide requires calcination temperatures ranging from 1900 to 2400 degrees F., and it is during this calcination stage that the carbon dioxide is released, and that the purification of the limestone is achieved, whereas the impurities present in the limestone are released as ash residues.

It can than be assumed for the purpose of establishing the longevity of the cured and matured or reacted ATW limestone product, that the release of the immobilized impurities or chemical substances, bound into and as an intergal part of the lime-cycle limestone product would require calcination at temperatures herein indicated.

#### CHEMISTRY OF LIME

The chemistry of lime is not complex. Lime is calcium oxide or a combination of calcium and magnesium oxides, in varying degree, formed by calcining (burning) limestone at a temperature high enough to drive off the carbon dioxide (CO<sub>2</sub>) content.

The figure below shows the cycle about which the chemistry of lime revolves, as limestone is converted to quicklime, to hydrated lime, and back to limestone again.



SOIL, LIME-FLY ASH REACTIONS

Reactions which occur in lime-fly ash-water systems are quite complex. Several studies provide basic information pertaining to these reactions.

Based on his own laboratory investigations as well as a review of other studies documented in the literature, Minnick (83) concludes that the major cementing compounds formed in lime-fly ash mixtures are probably calcium silicate hydrates, with other less common compounds and minerals such as ettringite. Low-sulfate sulfoaluminates may also be formed under favorable conditions.

The amorphus glassy component in the fly ash is believed to provide the constituent elements which form the complex silicate and aluminate compounds. The strength and durability of the lime-fly ash mixtures are directly related to the quantity of cementitious compounds formed by the reaction of the lime (CaOH and MgO) and the fly ash constituents. Since these reactions are also affected by time and temperature, the curing time and curing conditions have a significant effect on the properties of the mixes.

The reactivity of fly ashes from various sources is quite variable. For this reason, fly ash from each source should be carefully tested for reactivity before approved for use in LFA and LCFA mixes. Monitoring programs should be set up to establish the uniformity of the fly ash from each source.

Several studies (84 to 87) have established some basic properties of fly ash which are at least indicative of the fly ash reactivity. These include:

1. Increased percentage of fly ash passing the No. 325 (45-um) sieve (84) or increase surface area (85, 86),

2. Increased  $SiO_2$  (2, 3),  $Si)_2 + R_2O_3$  (2), and  $SiO_2 + AL_2O_3$  (85) contents (R = Ca<sup>++</sup> or Mg<sup>++</sup>),

- 3. Low carbon content (84) or low loss on ignition (86) and
- 4. Increased alkaline contents (86).

In addition to the primary reaction beween the lime and the fly ash, the lime may also react with the fines in the material being stabilized. Soil-lime reactions that may occur are cation exchange, flocculationagglomeration, and a soil-lime pozzolanic reaction.

Cation exchange and flocculation-agglomeration reactions take place quite rapidly and cause decreased plasticity of the fines and some "immediate" strengthening. The plasticity reduction improves workability and allows easier mixing with materials that contain substantial quantities of plastic fines.

Reaction products from the soil-lime pozzolanic reaction contribute to the development of the cementitious matrix in the stabilized mixture. Similar secondary soil-lime reactions have been noted for soil-cement mixtures containing "lime-reactive" fines.

#### Autogenous Healing

Longevity of the limestone product is further ensured by the ability of the product to self-mend or re-cement cracks which may occour by earth-quakes or undue settlement in or of the solidified in-place mass or after disposal in a landfill.

The unique characteristics of the treated product is its inherent ability to heal or re-cement across cracks by a self-generating mechanism. This phenomenon is referred to, as autogenous healing.

The degree to which re-healing will occour is dependent upon the availability of reaction products such as lime, clays and the moisture conditions. Some other factors may include the degree of contact of the fractured surfaces and curing conditions.

The property of autogenous healing ensures that the product is less susceptible to deterioration under repeated loading, (physical deformation) and more resilient to attacks by the elements than other materials which do not possess this property.

Calcium Oxide: Selected Clays Advantages

The use of Calcium Oxide and selected clays as waste: specific additives have some of the following advantages,

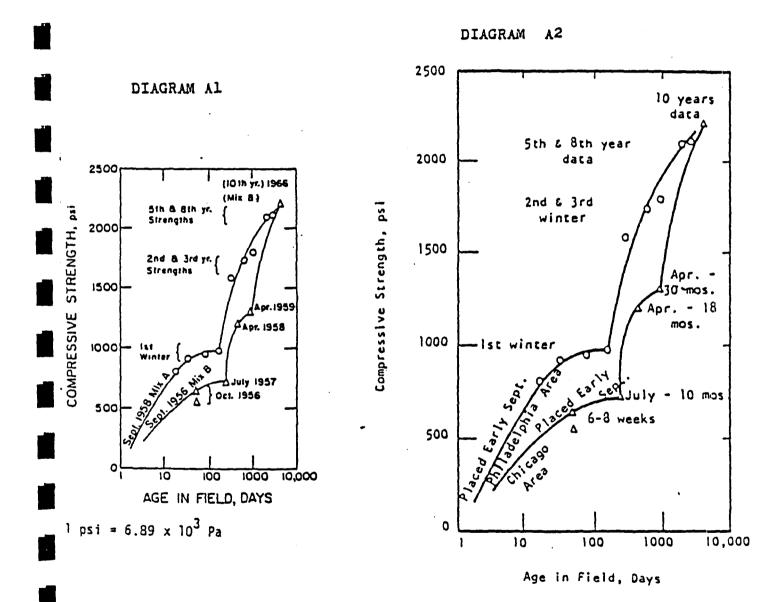
- The combined additives are highly tolerant of a wide range of contaminants typically present in industrial waste streams.
- 2. The efficiency and cost-effectiveness of the use of calcium oxide as a 'cheap' source of heat generation having mass dewatering capabilities, is not as yet fully recognized of its value in many industries.
- 3. Normally calcium oxide is slaked to calcium hydroxide during which mass ammounts of generating heat is wasted into the atmosphere.
- 4. One pound of calcium oxide typically generates in excess of 520 BTUS, @ \$80.00 per ton or .04 cents per pound, the cost per BTU is .00008 cents.
- 5. Along with the heat generation and dewatering capabilities, other built-in benefits is neutralization, pathogen destruction, saponification of oils and greases, pozzalanic cementing, lime-cycle and the mechanism of self-mending.
- 6. The combined lime: clays provide for high absorption and effective cementing qualities.

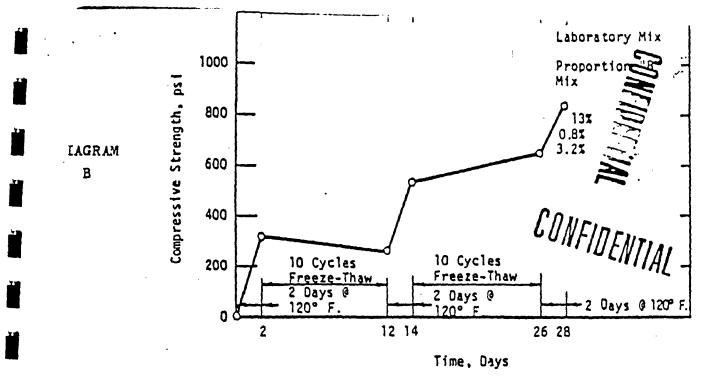
Longevity Of Processed Product And Age-Strength Relationships

The following diagrams illustrate the structural and permeabilities in-time of the processed product.

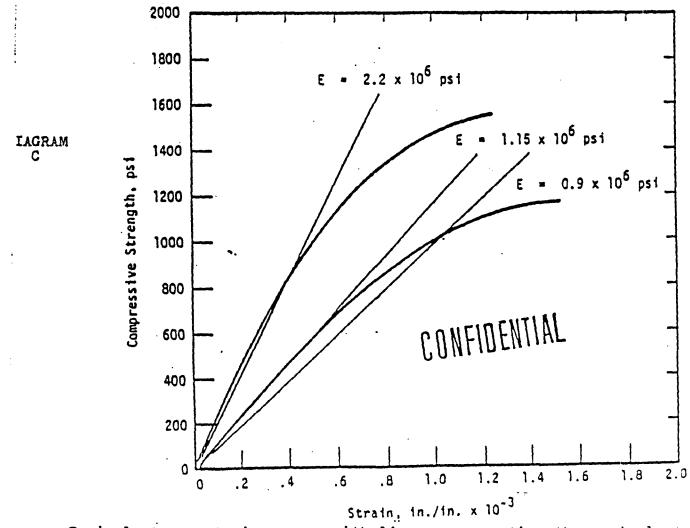
Curing at low temperatures retard the reaction process of the processed product and almost stop the reaction below 40 degrees F. Reduced temperatures or even below freezing temperatures have no apparent permanent detrimental effect on the chemical properties of the reagents or additives. The product may be subjected to a significant number of freeze-thaw cycles in the field during the winter months. Increases in strength are again developed with rising temperatures during the subsequent spring and summer months. Chemical reactions within the product continue as long as free and sufficient lime, clays and reagents are available.

The following investigations were conducted by Terrel, Epps and Associates of Seattle, Washington.

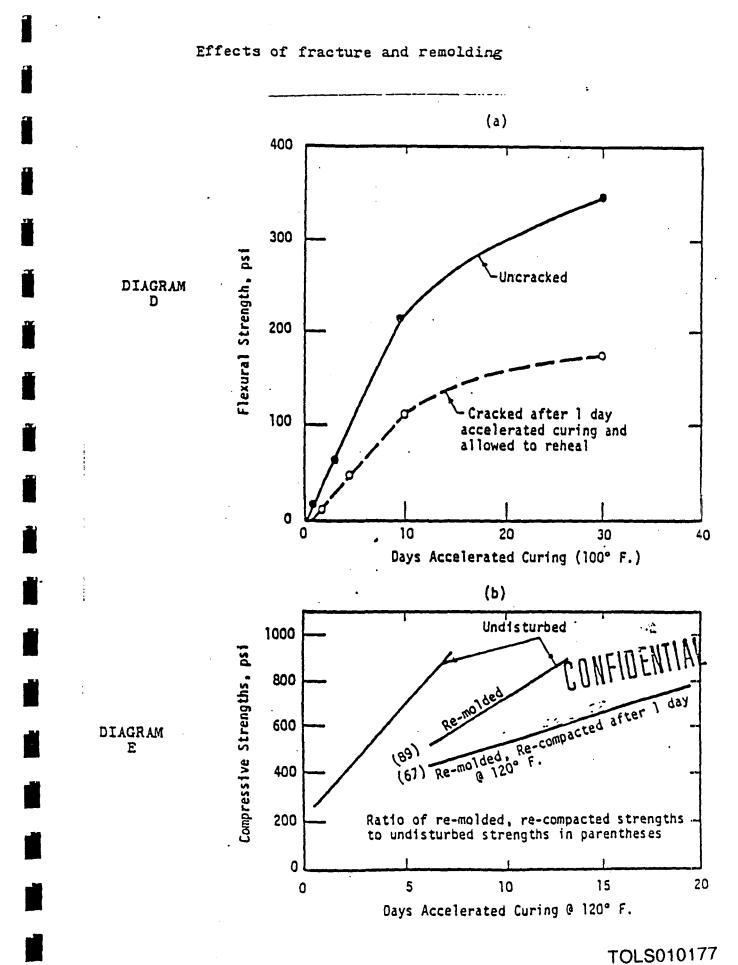




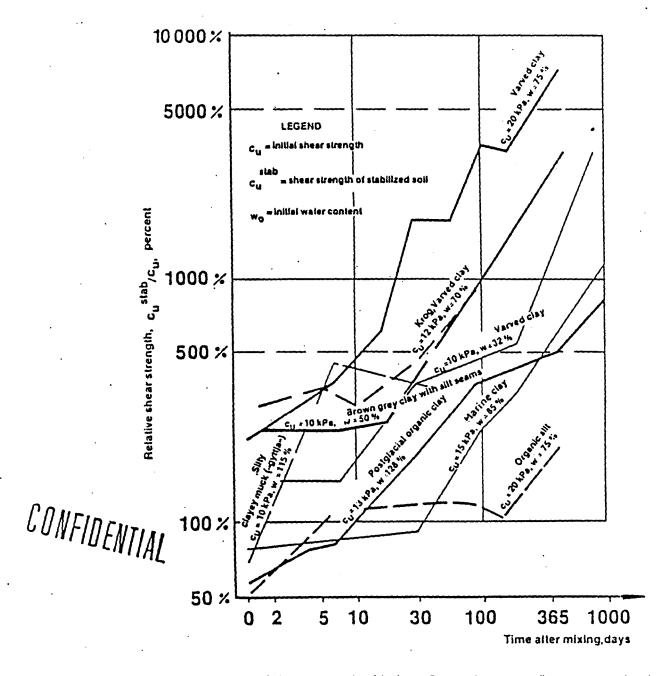
Effects of freezing and thawing plus elevated temperature curing on compressive strengths



Typical stress-strain curves with lines representing the equivalent E values calculated for the materials

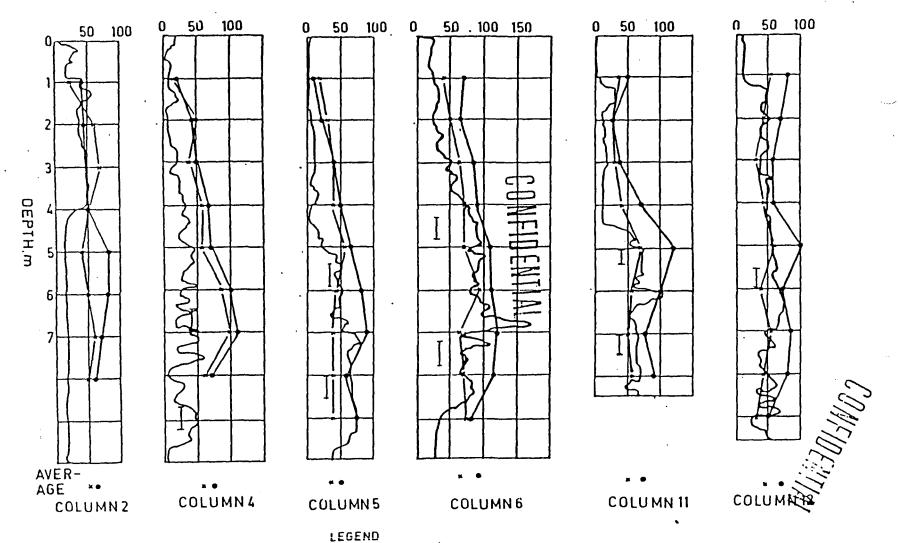






Increase of shear strength with time. Results from unconfined compression tests.

CHART (B)
SHEAR STRENGHT kPa



I STATIC CONE PENETROMETER: • PENETROMETER TEST; \* VANE TEST; I COMPRESSION TEST;

Note: The tests conducted (50) Days after treatment.

#### PERMEABILITY

The effect of the process is to induce a low permeability ( $10^{-6}$ cm/sec) quickly and then slowly approach the  $10^{-7}$  and  $10^{-8}$  cm/sec range.

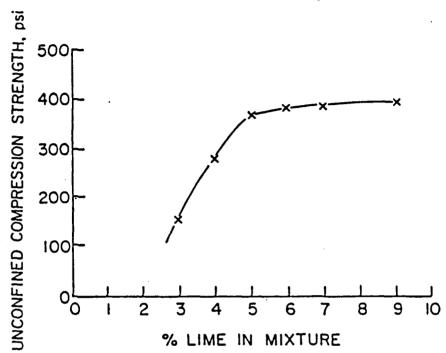
DIAGRAM

PERMEABILITY	
Inicial 1 day 7 days 21 days 28 days	Stabilized Sludge 6.1 x 10 <sup>-6</sup> cm/sec 3.4 x 10 <sup>-6</sup> cm/sec 2.8 x 10 <sup>-6</sup> cm/sec 2.3 x 10 <sup>-6</sup> cm/sec 2.1 x 10 <sup>-6</sup> cm/sec

CONFIDENTIAL

The above investigation was conducted by Sludge Fixation Technology, Incorporated, September 1977, Investigator R.E. Valiga

Soil-lime specimens were prepared at optimum moisture content and maximum dry density (18.0% and 105  $1b/ft^3$  respectively) with 3, 5, 7, and 9% lime, and these specimens were tested in unconfined compression with the following results:



#### TYPICAL PROPERTIES OF LIME-FLY ASH STABILIZED SOILS

Pozzolanic reactions from which LFA mixtures derive their long-term strengths are influenced by many factors, including ingredient materials, proportions, processing, moisture content, field density, and curing conditions. The pozzolanic nature of fly ash and its reaction with lime is discussed in Chapter III, with details on how characteristics of the fly ash itself affect the reaction.

For an LFA mixture to develop its maximum possible streng..., the ingredients must be thoroughly mixed. The time required to achieve a uniformly belinded product depends upon the type and efficiency of the available mixing equipment, mixture proportions, and, to some extent, on the ingredients themselves.

Curing conditions have a profound influjence on the properties of LFA mixtures. Both curing time and temperature greatly affect the strength and durability of "hardened" mixtures. (Figure 13).

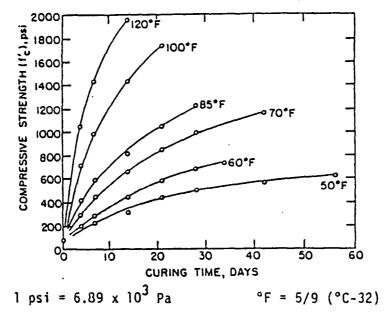
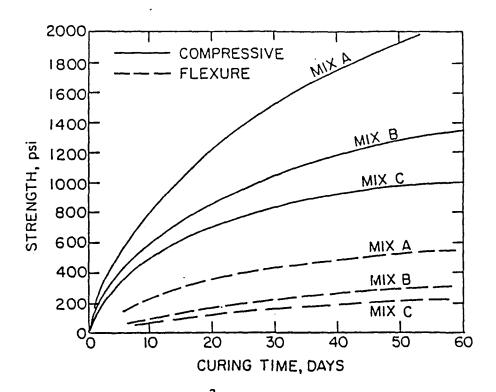


Figure 13. The effects of curing time on the strength of selected LCFA mixtures at varying curing temperatures.

Because of the combined effects of time and temperature on the strength development of the LFA mixtures, it is difficult to specify combinations of curing conditions which simulate field conditions. One method of taking into account the combined effects of temperature and time is to combine the two variables into a single variable called a degree-day. The degree-day concept is detailed in Reference 105.



1 psi =  $6.89 \times 10^3$  Pa

Figure 15. Relationship between flexural and compressive strength of LFA mixes cured at ambient temperature.

Proposed Treatment References



## Landfilled wastes

# treated in place

#### **GZFRANCIS**

The ideal solution for dealing with landfilled hazardous sludges that have the potential to leach and contaminate the groundwater, is to dig out the waste, treat it, and relandfill it. This is a lengthy and an expensive procedure, especially if the amount of waste is large and the treatment method complicated.

In some cases, it may be possible to indefinitely stabilize the disposed waste onsite at only a fraction of the cost. A good example of such a case is a major industrial facility in Maryland. Since 1974, the company has generated and accumulated about 8,000 yd3 of hazardous waste sludge in an onsite landfill. The waste is listed in both the federal and state hazardous waste regulations.

#### Waste characteristics

The landfilled sludge consists of a mixture of three types of wastes. As specified in the EPA regulation 40 CFR Part 261, promulgated under the Resource Conservation and Recovery Act (RCRA), and Maryland State COMAR 10.51 "Disposal of Controlled Hazardous Substances," the types of wastes are:

F006, "Wastewater treatment sludges from electroplating operations."

F017, "Paint residues or sludges from industrial painting in mechanical and electrical products industry."

F018, "Wastewater treatment sludges from industrial painting in the mechanical and electrical products industry."

F017 and F018 constitute a minor part of the landfilled sludge. They were delisted in 1981 from federal and state hazardous waste regulations, and are no longer considered hazardous wastes. F006 constitutes the major part of the landfilled sludge. It is still a listed waste in both regulatory programs despite a petition submitted by the facility three years ago to delist it. As a result, the landfilled sludge mixture as a whole is considered by regulation a hazardous waste.

The basis for listing F006 as a hazardous waste is its toxicity due to the presence of the hazardous constituents: Cadmium, chromium, nickel, and cyanide. However, recent core sample analyses indicated that nickel in the form of nickel hydroxide is the only hazardous constituent present in a significant concentration.

Physical Properties of Waste:
 Physical state at 70 F: semi-solid
 Density (lb/ft³): 93
 Flash point, close cup method: 200 F
 pH of 1:1 wastewater slurry: 8.5
 Reaction with acid, 1% HC1: mild, odor of H₂S
 Reaction with base, 1% NaOH: none
 Solids, dry weight basis, 105° C: 52%

Loss on ignition: 50.8% Color: homogeneous pea green

Odor: mild

Phases: single phase

Texture: smooth uniform sludge True vapor pressure: 0.09 psia Permeability: very low

2. Major Components of Waste:

Water contents by KF Method:	50.2%
Ash:	49.2%
Organics, by difference:	0.6%

3. Chemical Analysis of Waste:

Unless otherwise specified, all analyses were performed according to EPA "Manual Methods for Chemical Analysis of Water and Wastes," March 1070

(a) Analysis of Waste Sludge as of generation:

The sludge was digested with aqua regia, and analyses were performed by Atomic Absorption Spectroscopy. The following results were obtained:

Of he We

•	% by wi
Calcium (CaO)	6.72
Magnesium (MgO)	2.26
Iron (Fe <sub>2</sub> 0 <sub>3</sub> )	10.10
Aluminum (Al <sub>2</sub> O <sub>3</sub> )	0.48
Acid Insolubles	23.40
	ppm
Arsenic (As)	1.12
Barium (Ba)	62.00
Cadmium (Cd)	2.30
Chromium, total (Cr)	6,500.00
Chromium, hexavalent (Cr-6)	0.00
Lead (Pb)	250.00
Mercury (Hg)	0.06
Silver (Ag)	7.70
Nickel (Ni)	8,100.00
Copper (Cu)	200.00
Zinc (Zn)	5,000.00

#### (b) EPA Extraction Procedure:

(1) A similar sample was also tested for metals using the EPA Extraction Procedure (EP), Federal Register, Vol. 43, No. 243. The following results were obtained:

	Mg/liter
Arsenic (As)	0.002
Barium (Ba)	0.090
Cadmium (Cd)	0.000
Chromium, total (Cr)	0.190
Chromium, hexavalent (CR++)	0.000

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Lead (Pb,	0.020
Mercury (Hg)	0.000
Silver (Ag)	0.010
Nickel (Ni)	0.460
Copper (Cu)	0.020
Zinc (Zn)	0.150

(2) Four samples of the same sludge were taken over a 45 day period and subjected to the test for the EP toxicity characteristic as defined in the Federal Register, Vol. 45, No. 98, May 1980. The following results were obtained:

	Mg/liter
	of Extract
Arsenic (As)	0.00
Barium (Ba)	0.30 - 0.40
Cadium (Cd)	0.00
Chromium, total (Cr)	0.05 - 0.28
Chromium, hexavalent (Cr+6)	0.00
Lead (Pb)	0.00 - 0.01
Mercury (Hg)	0.00
Selenium (Se)	0.00
Silver (Ag)	0.00 - 0.02
Endrin	0.00
Lindane	0.0
Methoxychior	0.0
Toxaphene	0.0
2, 4 D	0.0
2, 4, 5 TP Silvex	0.0

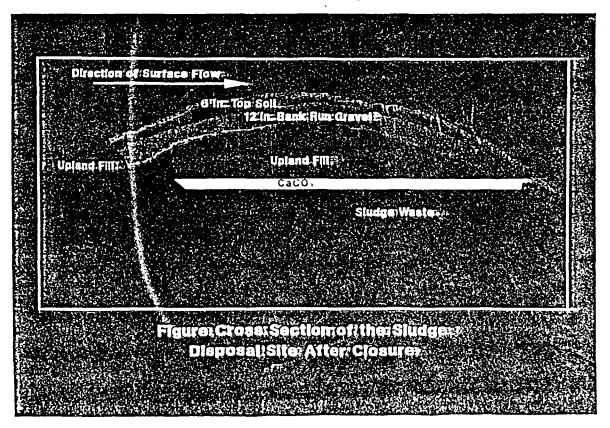
(3) Most recently, a sampling program was de-

signed and carried out to more accurately represent the composition of the landfilled sludge. Analysis was limited to parameters of concern. Samples were taken at varying depths using a random table of numbers following the procedures outlined in the EPA publication "Test Methods for Evaluating Solid Waste," July, 1982, SW-846, Second Edition. Enough samples were taken for an 80 percent confidence level. The following is a summary of the results obtained.

	Mg/Liter	
	Maximum	Average
Copper (Cu)	0.63	0.38
Nickel (Ni)	63.00	48.30
Cadmium (Cd)	0.01	0.00
Chromium, total (Cr)	1.20	0.68
Chromium, Hexavalent		
(Cr-6)	0.00	0.00
Lead (Pb)	0.10	0.04
Zinc (Zn)	63.00	40.70
Iron (Fe)	67.00	11.10
Free Cyanide		
(water extract)		0.00
Phenoi		
(water extract)		0.00

#### Disposal site

In 1980 an investigative study was conducted on the site. The main purpose of the study was: (1) to obtain a background description of the geology and surface water and groundwater conditions, (2) to provide informa-



tion with regard to the hydrogeologic setting of the area. (3) to drill 12 boreholes in the vicinity of the disposal site and install groundwater monitoring wells in five of these boreholes, and (4) estimate rates and directions of groundwater flow and determine groundwater quality conditions on site.

The study revealed the following:

- The site is located about 2,000 ft from the property line and about 3,000 ft from the nearest residential area. The uppermost water table aquifer is at 10 30 ft below the waste. This aquifer is not used for public or private water supply in the immediate vicinity of the site.
- The topography is gently rolling, but is quite uneven as the area in the past had been quarried for sand and gravel. Small streams drain the site from west to east.
- Boreholes were drilled to depths of 30 40 ft. A geologic description was developed from the split-spoon samples taken at 5 ft intervals during the drilling of each borehole. The disposal site was found to be underlain by a thin discontinuous deposit of clay and silt. In turn, this is underlain by 15 25 ft of unconsolidated sand and silt deposits which represent the shallow water table aquifer. The aquifer is underlain by clay and saprolite.
- Shelby tube samples were taken from seven boreholes. Falling head permeability tests were run on these samples to determine values of hydraulic conductivity. Based on the obtained hydraulic conductivity value of 28.5 ft/day, rates of groundwater flow were estimated to range from 1.1 to 1.6 ft/day.
- By measuring water level changes referenced to "mean sea level" in all of the monitoring wells over a 10 day period, the principal direction of the groundwater flow in the shallow water table aquifer was determined. This was found to be towards topographic low areas to the east and south.
- Groundwater was monitored continuously every three months. Samples were collected from monitoring wells. Analyses were performed on samples that were filtered through a 0.45 micron membrane filter. There was no evidence of groundwater quality deterioration over a period of 4 years and the concentrations of constituents were within U.S. EPA's drinking water standards.

Since the sludge deposit location relative to the uppermost aquifer rules out groundwater as a leaching medium, the only remaining leaching source is natural precipitation. Information obtained from the National Climatic Center, Ashville, indicates that rain and snow in this area average 44 in./yr with a pH range from 3.5 to 4.5.

#### The solution

To bring the hazardous sludge landfill into compliance with the regulations, the company was ordered by the Maryland Waste Management Administration to close the site. A closure plan was discussed with the company and agreed on in principle.

The plan is based on the fact that nickel hydroxide solubility in water can be effectively controlled by controlling the pH. Solubility is a minimum at a pH of 10.2. At such alkalinity, nickel hydroxide's solubility at room

temperature is less than 0.001 mg/l. The solubility increases to 0.1 mg/l at a pH of 9.2 or 12.5, and to 3 mg/l at a pH of 8.5.

Since the pH of the waste is 8.5, no nickel in significant quantities has leached from the waste. In addition, the sludge tends to settle in place and become of low permeability causing water from precipitation to accumulate on the surface where most of it subsequently evaporates. Any precipitation that might migrate downward through the sludge deposit or contact with the sludge at the edges of the waste mass, should be neutralized by the sludge alkalinity.

Over time, the sludge alkalinity will be exhausted in certain spots of the waste mass. As a result, acidic rainwater will leach nickel from the sludge and possibly carry it to the groundwater under the sludge bed.

To prevent this from happening, and to keep the alkaline medium within and around the sludge mass indefinitely, the site will be covered with a layer of finely ground calcium carbonate to neutralize acid rain before reaching the waste. Then the site will be covered with mounded, compacted, and graded earth to divert rainwater and rainwater runoff from the waste. Finally, a 12 in. layer of gravel followed by a 6 in. layer of top soil will be added on the earthen cover. The top soil will be seeded to provide vegetation needed to prevent erosion. This plan is illustrated in the Figure.

Theoretically, the maximum pH that can be reached by dissolving calcium carbonate in water at room temperature is 9.8. However, laboratory experiments have revealed that calcium carbonate in the form of crushed oyster shells can raise the pH of rain water from 3.07 to 8.25. With further pulverizing of the oyster shells and mixing it with a small amount of lime, if needed, the pH can be brought to 8.5 to 9 (a pH of 9 is the maximum pH allowed by the regulations governing discharge into groundwater). This, in addition to the low permeability of the waste, is enough to reduce the potential hazard to an acceptable level. Solubility of nickel hydroxide in this pH range at room temperature is 0.25 to 3 mg/l.

Table. Tons/Acres CaCO required to neutralize 44 inches/year of rain

	,	Years of Ne	utralization	_
Rain pH	100	200	500	1,000
4.0	2.5	5.0	12.5	25
3.5	12.5	25.0	62.5	125
3.0	25.0	50.0	125.0	250
2.5	125.0	250.0	625.0	1,250

Note: 100 tons of CuCO, are enough to cover an acre with a I in. thick layer.

Calculations indicated that a 1 in. layer of calcium carbonate is enough to neutralize acide precipitation in the facility's area for more than 800 years (see Table). Total closure cost is estimated at \$100,000 to \$120,000. In contrast, digging out the waste and disposing of it by some other means was estimated to cost between \$900,000 and \$1 million.

G.Z. Francis is project manager in the Hazardous Waste Div., Maryland Office of Environmental Programs. Baltimore, MD.

### Pesticide-eating bacteria march on

Bacteria that degrade toxic substances are nothing new, but microbiologist Jeffrey Karns of the ARS has just added two important examples to the list. Karns recently described how enzymes produced by Flavobacterium degrade coumaphos, a pesticide used to kill insect pests of livestock, and how Achromobacter enzymes degrade carbofuran, a pesticide used to control corn rootworm and other crop insects.

Coumaphos is a "recalcitrant" molecule that stays in the soil for a long time before being broken down. Although coumaphos is water insoluble and thus doesn't pollute groundwater, it can be toxic to living things while it remains in the soil.

Previous attempts to degrade coumaphos waste have focused on ozonation, exposure of the pesticide to ultraviolet light. This did not work, Karns says, because coumaphos is a turbid solution and could not be destroyed by the light. But he and his colleagues found that incubating the waste with *Flavobacterium* beforehand degrades it to chlorferon, a clearer solution that can then be further degraded by ozonation.

Carboluran can be degraded by Achromobacter, a bacterial species that uses the pesticide as its only source of nitrogen, Karns says. These bacteria also degrade several other N-methyl carbamate insecticides, he says.

Karns is working on cloning the genes coding for the degradative enzymes of *Flavobacterium* and *Achromobacter*. "If this can be done," he says, "pesticide degradation will be more efficient because fewer [bacterial] cells will have to be used."

#### IN-SITU BIODEGRADATION

A majority of future waste site remediation methods will favor the costeffective strategies of in-situ biodegradation of subsurface contaminants; given the enormous costs for the impounded waste removal for redisposal, or enclosed bioreactor treatment. Technical difficulties: of
how to exeate and maintain a waste impoundment environment in which
organisms will quickly develop and thrive is the key. Volume throughput economics is a major restraining factor, whereas bioreactors used
for the biodegradation of large volumes of exhumed toxic wastes, are
neither cost-effective or efficient, since extensive residence times to
complete effective biodegradation, restrains high process volume throughput.

The removal and feeding of the waste to bioreactors are costly, while such activities pose potential health and environmental hazards to remediation workers and the surrounding environment.

The strategy by the use of the insitu treatment apparatus and described technologies, creates its own in-place subsurface treatment "bioreactors" within a waste impoundment. Selected aerobic or anaerobic microorganisms or a combination therof and their life substaining nutrients are simultaneously introduced and integrated with the physically and chemically conditioned saturated and unsaturated subsurface waste contents.

During the subsurface waste conditioning process, suitable sandy or porous type media may be introduced and integrated with the waste, if such suitable materials are not present therein. Porous type media improve the hydrogrology, allowing controlled and timely transport of nutrients within the subsurface treatment area (bioreactors), accelerating the stimulation and growth of the microbial community.

The addition of such porous media however, may not be a necessary function for the timely transport or microorganism development. The rate at which the microorganisms consume a contaminant is dependent upon the availability of sufficient contaminant: Specific microorganisms and suitable life substaining nutrients.

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The subsurface introduction of site/contaminant: Specific microorganisms and their nutrients, or the stimulation of such available microorganisms, biodegrade the biodegradable contaminants in both the subsurface contaminated soils and ground water.

The formulation of contaminant: Specific microorganisms, their required nutrients, and required subsurface conditioning is established by the evaluation and understanding of the critical subsurface hydrogeology, microbiology, chemical composition, and the chemical and physical composition of the subsurface soil contents. These subsurface evaluations would typically procede the subsurface conditioning and treatment stages, and be continued through-out the treatment process and thereafter, to verify the treatment projects objectives.

Subsurface contaminant volumes are substantially greater in proportion to other nutrients surrounding it.

Because this disproportionate ratio exists, only a limited number of microorganisms can develop. By creating a method for subsurface supplementation and recirculation of nutrients and oxygen to the treatment areas, a highly productive bioactive zone in both the water and soil phases, is created in which nutrients are supplemented, allowing microorganisms to develop on a controlled basis within the desired treatment areas.

#### IN-SITU WASTE VITRIFICATION

The insitu vitrification process transforms the subsurface waste contents into a vitrified mass by the use of a plasma arc torch(s), which are mounted on the earlier described insitu apparatus. An assembly consisting of plasma arc torch(s), and subsurface data acquisition probes are connected to a non-rotating spreader bar connected to the rotating kellys as earlier described.

The subsurface contents are conditioned and homogenized as the assembly is powered into the subsurface, while simultaneously feeding and integrating the conditioned and homogenized contents with controlled dosages of sand, silicates, limestone, sodium carbonate, selected silicates, borax and aluminum oxides, or other such required ingredient which are subsurface waste: Specific, to produce the desired final product.

The torchmounted assembly is introduced into the subsurface waste contents which are pulverized and homogenized and with which the various vitrification ingredients have been integrated, if such are not present.

As the assembly is being withdrawn from the subsurface, the torch(s) are activited and the reaction of melting takes place instantly. When the plasma cools, it reverts to a normal gas. Vapors, volatiles and gases liberated or released during the reaction are collected and scrubbed.

The plasma  $torch(\sqrt[r]{3})$  are mounted on the insitu assembly and placed at varying angles allowing maximum exposure to the waste contents as the assembly is withdrawn from the subsurface within the selected treatment area.

A plasma is created in a relatively simple piece of equipment called a torch, which is basically a pair of water cooled tubular electrodes separated by a small gap through which a gas is blown. Electric power (1-10 megawatts) is supplied to the torch, which produces an electric current through the gas, forming an arch between the two electrodes.

The arc, which can reach temperatures as high as 45,000 degrees F., heat the gas, splitting its moecules into ionized and electrically conducting atoms (a plasma), created by the plasma arc torch.

Such effected and melted volume could typically measure in surface area of 40 square feet and at depths of up to 60feet.

The volume is melted from the bottom up(withdrawal) while melting from the effected areas center to the outside limits or from the outside limits to the center, this being controlled by the positioned angle of the torch:

The melting action causes most organics to be destroyed, any that escape are captured in the collection shroud located over the treatment area and are treated in an off-gas processing scrubber.

Sorption And Fixation Of Chlorinated Hydrocarbon Pesticides

The fundamental sorption and desorption reactions between selected chlorinated hydrocarbon pesticides and selected clays were established by extensive in-house studies and investigations by several universities.

The effects of several important environmental factors, including PH, temperature, salt (NaCl) concentration and organic content on the sorption and desorption reaction were confirmed.

Organochlorine pesticides are rapidly absorbed by clays and also retained strongly after absorption. Only small fractions of the absorped pesticides can be desorbed. The environmental factors of PH, temperature and salt content appear to exert no significant effect on the sorption and desorption reactions. The organic pollutants present in the water phase also bear no effect on the reactions. However, an organic humus present in the sediment phase is able to enhance the pesticide absorption because chlorinated hydrocarbon pesticides are absorbed in much greater quantities by organic humus than by clay minerals.

The absorption and fixation of chlorinated hydrocarbon pesticides in an insitu mode or portable feeding and integration methods may involve the combining of selected clays with organic humus or organic humus as the principal absorping media. The selected media is integrated with the waste as a first or absorption stage, followed by the integration of calcium oxide and the G-B reagent as a second and final fixation stage. A patent is pending issue on the described technology. Certain Bio-tech organisms are also incorporated in the degradation stage.

IN-SITU BIO-RECLAMATION OF CONTAMINATED GROUND WATER AQUIFERS

The Traditional strategies for the remediation of contaminated ground-water plumes, involve the removal of the contaminated water, and treating it by aereation or by the use of activated carbon, and the re-introduction of the treated ground water into aquifers.

Other methods involve chemical treatment and biological treatment.

A typical biological treatment involves the placement of suitable microorganisms along with nutrients into drilled wells within the effected contaminated areas, allowing the microorganisms to develop bioactive zones and biodegrade the ground water contaminants.

Other biological treatments involve the introduction of nutrients into selectively placed wells to stimulate the microorganism activity present therein and accelerate their natural biodegradation. These strategies are somewhat limited in microorganism development, which thereby limit the desired acceleration of subsurface biodegradation.

An insitu bioreclamation strategy is herein described involving:

- a/ The physical containment of a contaminated ground water plume, while allowing the biodegradation and/or chemical detoxification of the contaminants within the selectively contained contaminated area.
- b/ The containment is achieved by the insitu placement of bioactive treatment block (bioreactors) adjoining each other to form a single, or more barriers, which partially or completely surround the identified moving plume. Such containment strategies may involve the placement of a barrier completely surrounding the moving plume, and the source of contamination, such as a (waste site or waste lagoon).
- c/ The containment barriers establish a bioactive zone by the subsurface introduction of suitable microorganisms and nutrients therein; or introduce nutrients to stimulate suitable microorganisms present within the placed barrier or containment area.

- d/ The inplace barrier directly surrounding the contaminated plume is described as the "attack or biodegradation active" barrier.
- e/ To direct, move, grow or develop the "attack or biodegradation active" microorganisms in the direction of the contaminants, a barrier consisting of a suitably developed rejection strain of microorganisms or a rejection media, surrounds the "attack barrier". This barrier is described as the "directional active barrier".
- f/ The rejection microorganisms or other rejection media, placed in the "directional active barrier", are genetically or chemically engineered, causing the "attack or biodegradation microorganisms" to reject their adjacent presence and attack, grow or develop toward the contaminants to achieve their biodegradation.
- g/ As described earlier herein, certain metal and toxic chemical substances may stymic microbial growth. This is dependent on the types and concentration levels of biodegradable substance, and the non-biodegradable substances, a remedial strategy is established, whereas to whether the subsurface contaminants must first be biodegraded or chemically detoxified or vice; versa.
- h/ The described strategy involves the placement of a suitable insitu chemical detoxification barrier consisting of metal compound neutralization or reduction reagents, or other such suitable reagents in metered quantities to detoxify the toxic metal compounds and/or the toxic chemical substances, or such compounds that interfere or stymie biodegradation. This chemical detoxification barrier(s) are described as the "chemical barrier(s)".
- i/ Therefore the chemical barrier may be placed to completely surround the contaminants, if chemical detoxification is the first order of treatment; Surrounds the "biodegradation" barrier, and/or surround the "rejection" barrier if biodegradation is the first order of treatment.

j/ The attack barriers, rejection barriers, or chemical detoxification barriers, will vary in subsurface area or depths, depending on the contaminants species, concentration levels of biodegradable substances, the metal or toxic chemical compounds, and their depth and travel speed of the contaminated plume.

k/ The subsurface microbial and nutrient supplementing and recirculating strategy earlier described, will supplement the bioactive zones in the microbial treatment barriers, and/or supplement and recirculate suitable chemical reagents in the chemical detoxification barriers.

#### URANIUM MILLING TAILING TREATMENT

The process involves the neutralization of Radium-226 and Thorium-230 and other heavy metals. Radon-222 level reduction within hours exceeds 98.5 percent.

The treated tailings are transformed into highly structural and non-permeable solid matrix, which permanently isolates and shields gama releases and fluxes.

A method and process patent has been issued to ATW for this process

#### CONTENTS

- Technical Papers
- Investigations
- Reported Test Results of the ATW Process,
   Direct use and Contractors or Clients

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## Treated clay aids removal of dioxins

An inexpensive, widely available clay could prove to be a valuable weapon against toxic contamination from dioxin, polychlorinated biphenyls and other chemicals. Treated clay has already shown promise in adsorbing dioxins from industrial wastewater in University of Michigan tests, and future research could reveal further uses.

Two years ago, Dow Chemical Co. donated \$250,000 to the university to research an inexpensive way to remove dioxin from wastewater. Scientists there decided to try a three-layered montmorillonite clay. Such clay, when treated with hydroxy-aluminum, is commonly used to remove pollutants from oil wells, explains H. Scott Fogler, the Ame and Catherine Vennema Professor of Chemical Engineering at the university. After several months, the research team found that the clay, which is commonly found in Wyoming and other western states, could adsorb the dioxin.

In its natural state, the clay is a poor adsorbent, says assistant research scientist Keeran R. Srinivasan. When treated with a commercially available solution of hydroxy-aluminum, however, it turns into a molecular sieve.

According to Fogler, in tests comparing the clay with activated carbon, the clay adsorbed dioxin twice as well. The clay is also less expensive than activated carbon and other filters now on the market. Fogler says a ton of treated clay costs about \$80. Carbon, in comparison, costs about \$600 per ton.

Fogler believes the clay could be used in industrial and municipal wastewater-treatment plants, and as a liner to prevent seepage of hazardous chemicals from toxic-waste dumps. In wastewater treatment the effluent stream would have to be passed through the clay, possibly by dispersing the clay in a solution with the effluent.

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# Removal of toxic metals from power-generation waste streams by adsorption and coprecipitation

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Release of toxic substances and their dispersal in the environment can have tragic effects on exposed populations. These substances are more easily controlled when they are generated than after they are dispersed. Hence, our success in minimizing the adverse impacts depends largely on our ability to design treatment processes that isolate and remove the contaminants at their source. To describe and predict the fate of these substances in treatment systems and the natural environment requires a fundamental understanding of the mechanisms controlling the chemical reactions in which they participate.

Liquid waste streams in coal-fired power plants contain a wide spectrum of trace elements, most of which originate in the coal and remain in the fly ash or bottom ash when the coal is burned. In addition, trace contaminants from sources other than the coal may be concentrated in cooling tower blowdown and other waste streams. We have conducted studies into the physical-chemical behavior in heterogeneous aqueous environments of such trace elements as Cd, Cu, Pb, Zn, As, Se, and Cr. All of these elements are known to be trace contaminants in waste fluids from various operations in coal-fired power plants. In particular, we have assessed the potential to treat these wastes by adsorption of the various contaminants on hydrous iron oxide surfaces.

There are many factors that affect the adsorbability of a dissolved element. Among these are its chemical form (that is, oxidation state, degree of complexation), solution pH, ionic strength, the presence of competing adsorbates, identity and crystallinity of the solid substrate, time of contact, and others. In this paper we present results of adsorption studies using complex waste solutions from full-scale, operating power plants and compare these with the results in simple, well-characterized solutions. Our emphasis is on the application of adsorption as a waste treatment process in coal-fired

plants. Details of a mathematical model to describe the adsorption process and the effects of competing metals and complexing ligands are presented elsewhere. 1-3

#### ADSORPTION ON OXIDES: IMPORTANT VARIABLES AND TRENDS

There have been numerous adsorption studies describing the binding of environmentally significant chemical species on oxide surfaces.<sup>4-7</sup> In most of these, binding of a single adsorbate has been determined as a function of solution pH, solids concentration, or adsorbate concentration. Although there are some differences among systems, enough data are available to generalize certain conclusions. In this section, a brief description is given of the primary factors affecting adsorption of potentially toxic trace cations and anions.

Despite the complexity of wastes, adsorption of trace contaminants follows a rather simple model.

Effects of pH and adsorbent concentrations. It is widely accepted that oxide surfaces can act as weak acids or bases in solution, undergoing protonation and deprotonation in response to changes in solution pH.

$$\overline{SO^-} + H^+ = \overline{SOH} \tag{1}$$

$$\overline{SOH} + H^+ = \overline{SOH_2}^+ \tag{2}$$

(SOH represents a singly protonated surface oxide site.) In addition, the surface can enter into "complexation" reactions with other ions in solution.

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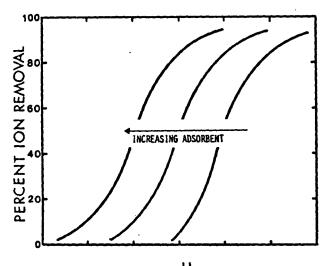
$$\overline{SOH} + Me^{n+} + mH_2O$$

$$= \overline{SO \cdot Me(OH)_m^{n-m-1}} + (m+1)H^+ \quad (3)$$

$$\overline{SOH} + An^{n-} + mH^{+} = \overline{SOH_{m+1}An^{m-n}}$$
 (4)

Me and An represent cationic and anionic adsorbates respectively. The exact location of the bound ions and the value of m in Equations 3 and 4 are not agreed upon. However, the observations that protons are generally released to solution when an uncomplexed metal adsorbs, and removed from solution when an anion adsorbs, are not in dispute.

Inspection of Reactions 3 and 4 allows one to predict the effects on adsorption of changing pH or adsorbent concentration (SOH). For both Reactions 3 and 4, increasing SOH drives the reaction to the right, increasing



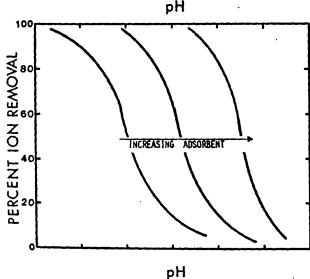


Figure 1—Typical pH-adsorption edges for cations (top) and anions (bottom) as a function of adsorbent concentration.

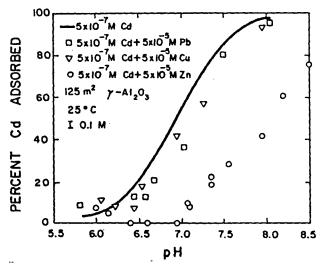


Figure 2—The effect of Pb, Cu, or Zn on the adsorption of Cd onto  $\alpha$ -Al<sub>2</sub>O<sub>3</sub>. Competition for adsorption sites shifts the Cd adsorption edge to more alkaline pH in these cases.<sup>9</sup>

adsorption. Similarly, increasing pH increases adsorption of cations (Reaction 3) and decreases adsorption of anions (Reaction 4). These predictions have been verified by numerous workers for a wide spectrum of metals, anions, and oxide adsorbents. Typically adsorption of metals increases from near nil to near 100% as pH increases through a critical range 1 to 2 units wide. Adsorption of anions is a "mirror image" of cation adsorption. The range of rapidly changing adsorption behavior is called the pH-adsorption edge. The effects of solution pH and adsorbent concentration for typical adsorption systems are shown in Figure 1. Note that since the location of the pH-adsorption edge depends on adsorbent concentration, a statement such as "cadmium adsorbs onto iron oxide at pH 7" is meaningless unless the concentration of adsorbent is known.

Effects of competing adsorbates. When several potential adsorbates are present in a solution, adsorption of any adsorbate reduces the number of binding sites available to the ions remaining in solution. In extreme cases, adsorption of some ions may limit the availability of sites so much that adsorption of other ions is severely inhibited. This inhibition can take two forms: either the entire adsorption edge can be shifted; or adsorption may be suppressed in such a way that 100% removal of the poorly competing ion is prevented regardless of pH. Examples of each type of competition are shown in Figures 2 and 3.

Effects of complexing ligands. When metal ions bind to dissolved ligands to form soluble complexes, adsorption of the metal can be affected in several ways. Complexation may reduce the tendency of the metal ion to sorb, as apparently is the case when cadmium ions form complexes with chloride or sulfate (Figure 4). Alternatively, if the ligand is an anion that adsorbs strongly at

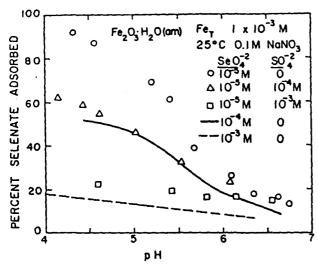


Figure 3—Effect of SO<sub>4</sub> on SeO<sub>4</sub> adsorption. Competition for adsorption sites prevents complete removal of SeO<sub>4</sub> from solution even at low pH in systems with high SO<sub>4</sub> concentrations.<sup>16</sup>

low pH, the ligand may bind to the surface at low pH and "take the metal along with it" (Figure 5). This is the most plausible explanation for the effect of cyanide on nickel adsorption, shown in Figure 6. Davis and Leckie<sup>12</sup> have suggested some criteria which may help predict how a given complex will behave, but at this time, such a priori predictions cannot be made with confidence.

Formation of new surface phases. In moderately concentrated solutions, an adsorbate may precipitate at an oxide surface when conditions are such that it would

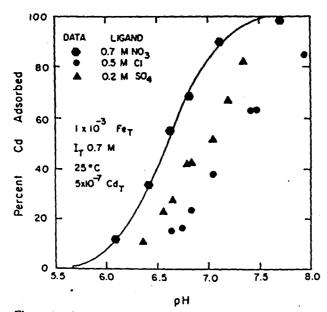
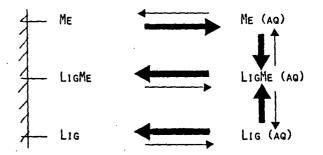
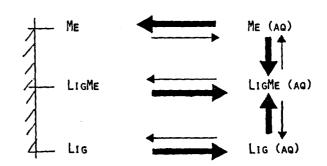


Figure 4—Effect of complexation by CI or SO<sub>4</sub> on Cd adsorption onto amorphous iron oxyhydroxide.<sup>13</sup>

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LOW PH METAL-LIGAND-SURFACE INTERACTIONS



HIGH PH METAL-LIGAND-SURFACE INTERACTIONS
Figure 5—Schematic representation of the reactions leading
to enhanced adsorption of a metal at low pH in the presence

not precipitate from bulk solution. In this case, other adsorbates may bind to the new surface and may be prevented from contacting the original surface.<sup>13</sup> Depending on the relative binding strengths of the two solid phases for a given adsorbate, adsorption may increase or decrease when the new phase forms.

of a complexing ligand.

## ANALYTICAL AND EXPERIMENTAL PROCEDURES

Preparation of fly ash leachate and boiler cleaning solutions. Adsorption experiments were conducted to compare treatability of power plant waste streams with results from the model systems described above. In some experiments wastewater was treated by exposure to reagent-grade iron oxyhydroxide. In other cases an iron-bearing waste stream was used as the source for the iron oxyhydroxide. Thus in the latter case the goal was to mix two wastewater streams in such a way that the quality of both improved, thereby minimizing the costs of chemical additives required.

Fly ash leachate solutions were prepared as follows. Fly ash suspensions of 100 g/l in deionized water were shaken continuously for 4 days. The fly ash was then allowed to settle for 2 days and the supernatant was siphoned into clean carboys and stored at room tem-

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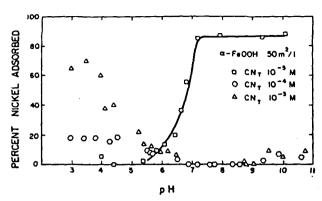


Figure 6—Enhanced adsorption of Ni on  $\alpha$ -FeOOH from the presence of CN.<sup>11</sup>

perature. The solution was in continuous contact with the atmosphere.

Boiler cleaning solutions were received from the

power plants in 5-gal plastic containers and were stored in the original containers at room temperature until use.

Trace-element analysis. Analyses for sulfate, alkalinity, chloride, sodium, potassium, magnesium, and calcium followed the procedures outlined in "Standard Methods." The trace elements zinc, copper, cadmium, selenium, chromium, arsenic, lead, and nickel were analyzed using an atomic adsorption spectrophotometer equipped with a heated graphite furnace. A pH meter was used to measure pH. Ammonia was measured with an ammonia-specific ion electrode and a microprocessor analyzer.

In some adsorption experiments, radioactive tracers were added to the solution and were analyzed using a well counter with a 1.75 X 2-in.-thick NaI (T1) crystal.

Procedure for a typical adsorption experiment. In a typical experiment iron was added to solution and precipitated by raising the solution pH to 7.0 by dropwise addition of 1.0 M NaOH. The iron source was either

Table 1—Characteristics of typical waste streams from coal-fired power plants.\*

Waste stream	Volume	Frequency	Major pollutants	Typical treatment process
Cooling tower blowdown	20-7 200 × 10 <sup>3</sup> gal/day	Continuous	Zinc, chromate, phosphate, organic biocides	Chromate reduction to Cr(III); Precipitation for zinc(II), chromium(III), phosphate; Carbon adsorption for organics
Recirculating ash-handling water. Blowdown (both bottom and fly ash)	300 gal/day MW	Continuous	Nickel, zinc, chromium, copper, lead, arsenic, cadmium, selenium	Ponds for treatment through sedimentation, chemical precipitation and adsorption
Boiler blowdown	100 gal/day MW	Continuous	Possibly alkalinity, TDS or EDTA, but overall quality is high	Generally does not require treatment, may be discharged to ponds or mixed with miscellaneous wastes
Evaporator blowdown	0.1-1 060 × 10 <sup>3</sup> gal/day	300-365 cycles/yr	High in TDS	Reuse within plant for applications not requiring low TDS water
lon-exchange	88 gal/day MW	52-365 cycles/ yr	Usually very low (H <sub>2</sub> SO <sub>4</sub> ) or very high (NaOH) pH; also very high in TDS and Cu, Fe, and Zn of 20-200 mg/l	Neutralization to pH of 6.0-9.0 and use throughout plant or use as low-grade acid or caustic
Boiler cleaning	3-5 boiler yolumes. 4 gal/day MW	Once/7 mos. to Once/100 mos.	Copper, ammonia, EDTA, zinc, chromlum, selenium, nickel, iron	Ammonia oxidation followed by heavy metal precipitation.
	gwyddy mrv		•••	Treatment in ash ponds; incineration, especially for EDTA containing waste; disposal by chemical cleaning contractor
Fireside cleaning	24-270 × 10 <sup>3</sup> gal	2-8/yr	Alkaline solutions containing high TDS, TSS, zinc, iron, nickel, chromium	Usual procedure is to discharge to ash ponds
Air-preheater	43-600 × 10 <sup>3</sup> gal 100 gal/day MW	4–12/уг	Essentially same metals as boiler cleaning except more iron, copper, nickel, chromium; also oily wastes and polynuclear hydrocarbons, alkaline detergents	Same treatment method as for boiler tube and fireside cleaning

<sup>\*</sup> Data from References 17, 18.

0.1 M reagent-grade Fe(NO<sub>3</sub>)<sub>3</sub> in 0.5 M HNO<sub>3</sub>, or the acid-iron boiler cleaning solution. The precipitate is an x-ray amorphous material generally referred to as amorphous iron oxyhydroxide, and represented by the approximate chemical formula Fe<sub>2</sub>O<sub>3</sub>·H<sub>2</sub>O(amorph). Its surface properties have been characterized by Davis et al. 15 Depending on the experiment, the solution phase consisted of either 0.1 M reagent-grade NaNO3 in deionized water or one of the power-plant waste solutions. If necessary, trace metals were then added to the suspension. Aliquots of the suspension were transferred to glass centrifuge tubes. The pH of the suspension was changed by incremental additions of HNO3 or NaOH between aliquots. The centrifuge tubes were placed on an endover-end roller for 1 hour, and the pH in each was measured. The suspensions were then centrifuged and a sample of the clear supernatant was analyzed for the ions of interest.

## CHARACTERIZATION OF POWER PLANT WASTEWATERS

The range of pollutant characteristics from coal-fired power plants, including their identity, concentration, and mass loadings, is enormous.<sup>16</sup> This is caused by differences among fuel sources and differences in operating procedures, such as procedures used in boiler cleaning, prevention of scale formation, etc. A brief sum-

mary of some important waste stream characteristics is given in Table 1.

Six power plant waste solutions were used in this study. Three of these consisted of the supernatant from aqueous suspensions of fly ash from three different sources. The other wastes were water-side boiler cleaning solutions known as "Vertan\*" (Dow Chemical Co.), "ammoniacal bromate," and "acid iron." Values of selected major and trace elements in these wastes are listed in Table 2.

The most remarkable differences among the three fly ash solutions are in the Zn and As concentrations. Such variation is the rule rather than the exception when comparing trace metal concentrations in fly ash leache<sup>16,17</sup> and may result from differences in the concentration of the contaminants in the fly ash, different behavior during the leaching procedure, or other as yet unidentified sources.

The boiler cleaning solutions solubilize metals through the action of strong acid (acid-iron), complexation with ammonia (bromate), or complexation with ammonia and ethylenediamine tetraacetic acid (EDTA) (Vertan<sup>®</sup>). The EDTA concentration in Vertan<sup>®</sup> is ~5 to 10% by weight, which gives the Vertan<sup>®</sup> exceptional complexing strength. For instance, 0.05 percent solution of Vertan<sup>®</sup> in water is capable of reducing free Cu<sup>2+</sup> activity by more than two orders of magnitude (Figure 7).

Based on the different concentrations of competing

Table 2—Chemical characterization of fly-ash transport water and boiler-cleaning wastes from a coal-fired power plant.

•	F	ly-ash solutions	) <b>•</b>	1	Boiler-cleaning wast	03
Constituent	16	2°	34	Bromate*	Vertan® *	Acid-iron*
pH	- 8.9	11.3	12.4	10.4	9.3	0.7
Conductivity	1 740	1 180	4 000	<b>5 250</b> .	22 050	nm
Alk., mg/l	22.8	73.0	878	18 700	10 000	0
Cl, mg/l	1.9	3.1	2.5	1 100	2 300	40 000
SO <sub>4</sub> , mg/l	nm	nm	nm	nd	550	130
Na, mg/l	9.3	9.2	5.3	215	85	43
K, mg/l	16.2	15.0	1.4	0.7	1.4	0.31
Mg, mg/l	14.5	0.1	0.6	0.4	1.1	3.7
Ca, mg/l	34.6	262	99.4	· 0.9	0.6	3.3
Fe, mg/l	nd	nd	nd	nm	nm	5 130
Cu, μg/l	4.6	1.5	0.4	683 000	1 100	159 000
Zn, µg/l	2 870	39.7	2.0	0.8	6 630	15 890
Cd, µg/l	0.24	nd	nd	<0.5	<0.5	22
Cr, μg/l	230	512	119	3.8	4.6	1 620
Se, μg/l	390	511		151	86.7	<5.0
As, μg/l	49	57	0.1	, nd	20	7
Pb, μg/t	nd	nd	nd	nd	111	20.5
Ni, μg/l	<4	<2	<5	123	739	2 910
NH <sub>3</sub> , mg/l	nm	nm	nm	4 250	3 520	nm

<sup>\*</sup> Data for fly ash: water ratio-0.1, and 6-day contact period.

Note-nd-not detectable; nm-not measured.

TOLS010206

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<sup>&</sup>lt;sup>b</sup> Marshall Steam Station, Unit #1, Duke Power Co.

<sup>&</sup>lt;sup>c</sup> Marshall Steam Station, Unit #2, Duke Power Co.

<sup>&</sup>lt;sup>d</sup> Arapahoe Station, Public Service Co., Colorado.

Marshall Steam Station, Unit #2, Duke Power Co.

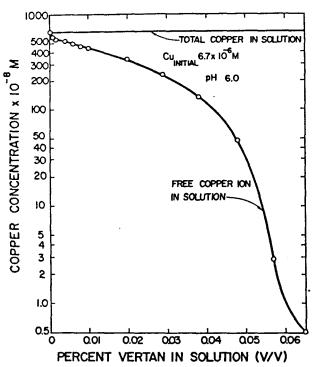


Figure 7—Changes in the activity of free Cu ion in a solution being titrated with Vertan<sup>®</sup> boiler-cleaning waste solution.

ions and complexing agents in the six waste solutions, one may expect significant differences in adsorption behavior among the six waste solutions. In the following section, experimental results from adsorption experiments using these wastes are presented and interpreted. Although the results presented here are primarily for removal of zinc from solution, the trends described are typical of those for the other metals studied (Cu and Cd) and are expected to be representative of other cationic trace metals (Ag, Pb, Hg).

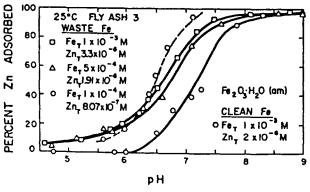


Figure 8—pH-adsorption edges for the removal of Zn from several different "clean" and "waste" solutions. The designation "clean" means that the source of the iron was reagent-grade chemicals.

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Table 3—Constituent concentrations in acid-iron waste/fly-ash No. 3 leachate systems for  $Fe_T = 10^{-3}$ .

Constituent	Concentration (M/I)
CI	$1.2 \times 10^{-2}$
SO₄	1.5 × 10 <sup>-5</sup>
Na	$2.4 \times 10^{-4}$
κ	$3.4 \times 10^{-5}$
Mg	$2.4 \times 10^{-5}$
Ca	$2.4 \times 10^{-3}$
Fe	$1.0 \times 10^{-3}$
Cu	$2.6 \times 10^{-5}$
Zn	$2.7 \times 10^{-6}$
Cd	1.5 × 10 <sup>-9</sup>
Cr	$2.5 \times 10^{-6}$
Se	<b>(</b> *)
· As	1.3 × 10 <sup>-0</sup>
Pb .	nd
Ni	1.5 × 10 <sup>-6</sup>
NHa	ტ

This represents contribution from acid iron. Sulfate not measured in fly ash leachate.

#### RESULTS AND DISCUSSION

pH dependence and effect of adsorbent concentration. Fractional adsorption of Zn as a function of pH in several different solutions is depicted in Figure 8. The dashed line represents Zn adsorption in a system containing only Zn2+, Fe2O3·H2O(amorph), and background electrolyte (NaNO<sub>3</sub>). As expected, removal of Zn from solution is highly pH-dependent, characterized by a pH-adsorption edge around pH 6 to 7. The remaining three (solid) lines depict Zn adsorption in systems comprised of acid-iron waste ("waste Fe") and Fly Ash 3 leachate. The removal curves are very similar to those in the "clean" system. Both the shape and location of the pH-adsorption edge in the 10<sup>-3</sup> M waste-Fe solution are nearly identical to those in the clean system. Furthermore, the pH-adsorption edge shifts to more-alkaline pH with decreasing waste-Fe concentration, as is typically observed in studies in clean systems.

Review of the compositions of Fly Ash 3 leachate and waste iron indicates that in the mixed waste solutions represented in Figure 8 all trace metals are present at concentrations  $\leq 10^{-4}$  M (Table 3). Furthermore, no strong complexing agent is present. Hence, the similarity between the clean system and the waste-Fe system is not surprising. Nevertheless, this set of experiments is significant in that it verifies the applicability of adsorption for treating the waste streams. Further, it lends some confidence that we have not ignored any characteristics of the wastes that could dramatically alter trace-metal adsorption.

Effects of competing adsorbates. Competitive interactions between pairs of trace metal adsorbates in the

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page.

<sup>&</sup>lt;sup>b</sup> Not measured in acid iron. Below detection limit in fly ash leachate.

<sup>&</sup>lt;sup>c</sup> Not measured in acid iron or fly ash leachate.

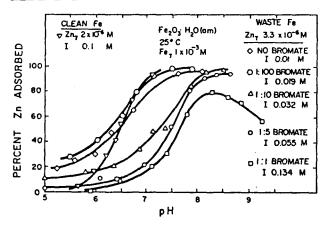


Figure 9—Fractional adsorption of Zn from solutions containing bromate boiler-cleaning waste solutions. The observed effects of adding bromate waste solutions are much greater than those expected from changes in ionic strength alone. The designation "1:100 Bromate" indicates that the solution phase was made by diluting bromate boiler-cleaning waste to 1% of its initial strength with deionized water.

waste solutions were evaluated by determining Zn adsorption onto the iron oxide adsorbent in solutions with varying concentrations of bromate boiler-cleaning waste (Figure 9). In these experiments the iron source was the acid-iron waste, and the solution phase contained only deionized water and bromate solution.

Zn adsorption onto waste iron was similar to but slightly greater than that in clean systems in this series of experiments. The enhancement may be due to the different ionic strengths of the two systems. Increasing amounts of bromate waste have little effect on Zn adsorption when the dilution bromate waste was present at low concentration (1:100 dilution). However, bro-

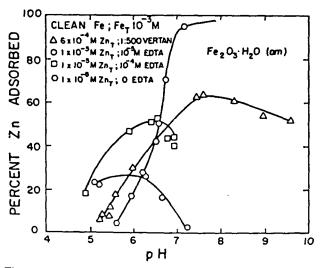


Figure 10—Fractional adsorption of Zn from solutions containing EDTA or a 500:1 dilution of Vertan<sup>®</sup> boiler-cleaning waste solution.

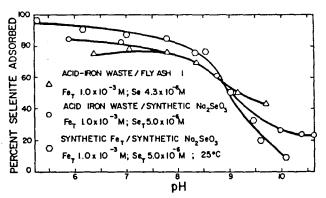


Figure 11—Adsorption of SeO<sub>3</sub> onto amorphous iron oxyhydroxide from solutions containing various combinations of reagent-grade or waste-derived constituents.

mate waste concentrations of 10% or greater significantly inhibit Zn adsorption, and the pH-adsorption edge shifts to higher pH.

As the bromate waste is added to the system, the concentrations of both NH3 and Cu increase dramatically (Table 2). The inhibition of Zn absorption may result from formation of a non-sorbing Zn-NH3 complex, from competition between Cu and Zn, or from some other cause. Calculations based on available stability constants<sup>19</sup> indicate that even under conditions where Zn is not complexed to any significant degree with ammonia, Zn adsorption is inhibited by the bromate waste. Thus it is unlikely that complexation with ammonia causes the shift in the Zn pH-adsorption edge. Total copper concentrations in these solutions are 10<sup>-3</sup> to 10<sup>-2</sup> M. Although most of the Cu is complexed with ammonia, the solutions are near saturation with respect to precipitation of Cu(OH)<sub>2</sub>(s) or a mixed hydroxidecarbonate solid. It is therefore possible that a solid copper phase is forming on the iron oxide surface and preventing Zn from contacting the reactive sites. If this is the case, the new phase is apparently a much weaker adsorbent for Zn than is Fe<sub>2</sub>O<sub>3</sub>-H<sub>2</sub>O(amorph). Alternatively, the Cu could compete for the iron oxide surface sites and prevent Zn from binding, even if no new surface solid phase was formed. We have not attempted to distinguish between these two possibilities. The exact Cu concentration needed to suppress Zn adsorption may vary significantly from one system to the next, depending on whether or not a new surface phase is created. Nevertheless, the results depicted in Figure 9 give an excellent picture of how a high concentration of one ion may affect the adsorption of another, and indicate that competitive interactions between two metals in power plant wastewaters correspond closely to those in clean solutions.

Effects of complexing ligands. It was noted earlier that complexing ligands can affect metal sorption in at least two ways. If the complex adsorbs weakly or not at all,

1)

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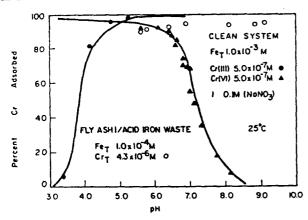


Figure 12-Comparative adsorption of cationic (Cr(III)) and anionic (Cr(VI)) forms of chromium onto amorphous iron oxyhydroxide in clean systems using reagent-grade chemicals as source of chromium and iron. Adsorption of chromium derived from fly ash 1 onto amorphous iron oxyhydroxide derived from acid-iron boiler cleaning solution.

complexation will reduce metal ion adsorption. While such a phenomenon was not observed in experiments with these particular wastes, it has been reported in the literature. 20,21

A second type of metal-ligand-surface interaction can occur if the ligand is capable of binding strongly to both the metal and the surface simultaneously. In this case the metal may be adsorbed as a complex at low pH and as a free ion at high pH.2,3,11,12 This phenomenon can be demonstrated by adsorption of Zn from a 500:1 dilution of Vertan<sup>®</sup> boiler cleaning solution (Figure 10). The total EDTA concentration in this solution is approximately 6 × 10<sup>-4</sup> M. The Vertan® enhances Zn adsorption slightly at pH  $\geq$  6.3. In clean systems, EDTA affects Zn adsorption in much the same way (Figure 10). The most likely explanation for this is that EDTA molecules tend to bind Zn, regardless of whether the EDTA is in solution (high pH) or at the surface (low pH). The

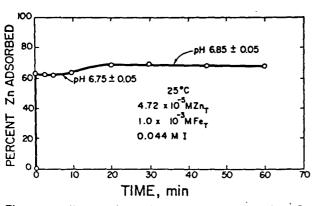


Figure 13-Kinetics of the adsorption of Zn derived from fly ash No. 1 onto amorphous iron oxyhydroxide derived from acid-iron boiler cleaning solution.

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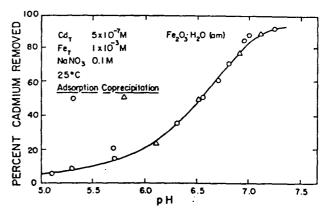


Figure 14—Comparison of adsorption and coprecipitation for removal of Cd from solution onto amorphous iron oxyhydrox-

similarity of the pH-adsorption curves in the two solutions suggests that EDTA is the dominant factor affecting Zn adsorption from Vertan® solutions.

Adsorption of trace anions from waste streams. Focus in the previous sections has been on removal of trace metals (cations). However, the removal of trace anionic contaminants from waste streams can also be accomplished by adsorption onto iron oxyhydroxide prepared from a reagent-grade iron source or from the acid-iron waste streams. Figure 11 depicts the excellent agreement among removal efficiencies for selenite as a function of pH for various combinations of clean and waste solutions. Although correspondence of adsorption behavior between clean and waste solutions was not always as excellent for other anions, the feasibility of using ad-

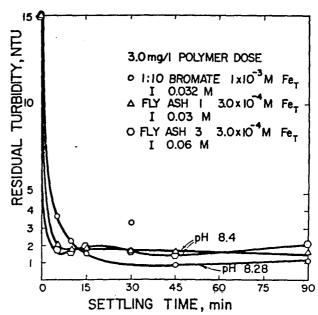


Figure 15-Residual turbidity as a function of settling time for 1:10 bromate and fly-ash solutions.

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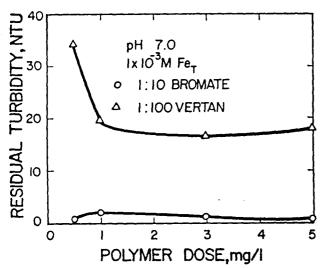


Figure 16—Variation of residual turbidity as a function of polymer dose for 1:10 bromate and 1:100 Vertan® solutions.

sorption to remove arsenate and chromate from powerplant waste streams has also been verified.<sup>10</sup>

For those atoms which can exist in either anionic or cationic form, changing the oxidation potential of the solution may be used to drive the adsorption reaction in either direction (Figure 12). Alternatively, adsorption behavior may be useful in inferring the oxidation state of an atom.<sup>22</sup> For instance, the strong adsorption of Cr at high pH in the acid-iron waste solutions suggests that most of the Cr in the system is present as Cr (III).

Kinetics and process design. Results presented thus far indicate that if equilibrium is approached or attained, trace contaminants can be efficiently removed from power-plant waste solutions by adsorption. For the process to be applicable in industry, equilibrium must be approached relatively rapidly. As shown in Figure 13, Zn adsorption in a system made by mixing two power plant waste streams is almost instantaneous. Similar results have been obtained for other metals and metalloids (for example, Cu, Pb, Cd, As, Se, Cr). In addition, Figure 14 indicates that the removal efficiency is essentially identical whether the iron is precipitated before the trace metal is added (adsorption) or afterward (coprecipitation). Avotins<sup>23</sup> has shown that removal efficiency is approximately the same regardless of the pH at which the iron is initially precipitated. In general, the finalsolution pH exerts the dominant control on trace-metal partitioning in these systems. Factors such as the order of addition of reagents or contact time have only a minor effect. Finally, the solids are easily separated from the solution phase, especially when small doses of a polymeric coagulant are added (Figures 15, 16). Details of this aspect of the study are available elsewhere. 10 All these factors suggest that adsorption is a flexible unit operation which can be adjusted to fit many different industrial processes. It is also a "tolerant" process, easy

to control and not sensitive to small changes in solution characteristics.

#### SUMMARY AND CONCLUSIONS

Removal of potentially toxic contaminants from aqueous solution by adsorption onto iron oxyhydroxide is technically feasible. Removal is primarily a function of pH, though other factors, such as adsorbent concentration, and concentration of other ions in solution, can also play an important role. Despite the complexity of waste streams from coal-fired plants, adsorption of trace contaminants from these streams is similar to that in simple "clean" solutions. In particular, the adsorption of Zn onto iron oxide from relatively dilute power-plant waste streams can be explained using a surface complexation model. Deviations from the behavior in dilute solutions can occur when the concentration of a competing ion, such as Cu, is high, or when a strong complexing agent, such as EDTA, is present. These deviations are interpretable using simple modeling concepts, and the interpretations can be experimentally tested and verified using well-defined solutions. The process is applicable for removing both cations and anions from solution and is adaptable to different process flowsheets and is relatively simple to control.

#### ACKNOWLEDGMENTS

Credits. This work was supported with funds from Electric Power Research Institute contract EPRI-RP-910. The authors would like to express their appreciation to George Parks, Bruce Honeyman, Gary Kaufman, Scott Altmann, and Ron Appleton for their technical support and helpful suggestions. Portions of this work were reported at the 35th Industrial Waste Conference, Purdue University, West Lafayette, Ind., May 13-15, 1980.

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TOLS010211



1775 CALLENS ROAD, VENTURA, CA 93003 + 805/644-1095

June 24, 1981

Job Number: C1-1100-C01

Lab Number: 815262

Sludge Master Inc.

1650 Chambers Rd., Suite #104

Aruora, Colorado 80011

ATTENTION: Frank Manchak

REGARDING: Leachate and Acid Digest on Raw and Treated Samples

Dear Mr. Manchak:

The samples of waste were submitted to us in a sealed-unopened shipping container by Federal Express (Air Bill #430225515) on May 1, 1981. The container was opened and the samples were removed for leachate analysis per your specifications. The samples were leached in accordance with proposed ASTM Method D19:12. The aqueous portion was then used for the appropriate analysis. The results are as follows:

Sample No.	Leachate PCB's	(ppm).	Total PCB's	(ppm)
1	< 0.02	•	110	
II	< 0.02		-	
III	< 0.02		-	
Constitutent (mg/L)	Raw Composite (acid digest)	Run #8 (leachate)	Run (#10) (leachate)	Run #11 (Téachate)
Arsenic	< 0.25	< 0.1	< 0.1	< 0.1
Barium	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	1.92	< 0.05	< 0.05	< 0.05
Chromium	372	57.5	50	37.5
Mercury	< 0.005	< 0.01	< 0.01	< 0.01
Lead	2700	< 0.1	< 0.1	< 0.1
Selenium	< 0.1	< 0.1	< 0.1	< 0.1
Silver	0.24	< 0.05	< 0.05 .	< 0.05

Respectfully submitted,

BTC LABORATORIES

R.K. Sextro

Chem Lab Supervisor

RKS:hra

TOLS010212

SANTA BARBARA (805) 966 9912 THOUSAND OAKS (805) 497-2401

#### 3.1. PRELIMINARY CHEMICAL ANALYSIS RESULTS

Chemical analysis results of nitric acid digestion of one untreated composite of six drill fluids and drilling muds as described in Section 2.

Element '	Concentrati	on *(mg kg <sup>-1</sup> )
Barium (Ba)		80
Beryllium (Be)		0.3
Cadmium (Cd)	•	1.9
Chromium (Cr)		15.6
Copper (Cu)		20.6
Cobalt (Co)		0.5
Fluoride (F)		0.01
Lead (Pb)		13.0
Mercury (Hg)		4.0
Nickel (Ni)		16.4
Molybdenum (Mo)		10.4
Selenium (Se)		0.15
Silver (Ag)	. ;	0.6
Antimony (Sb)	,	10
Arsenic (As)		0.7
Thallium (T1)	<del></del>	1
Vanadium (V)	. <del>_</del>	59

\*Wet Weight

#### 3.2. POST EXTRACTION ANALYSIS RESULTS

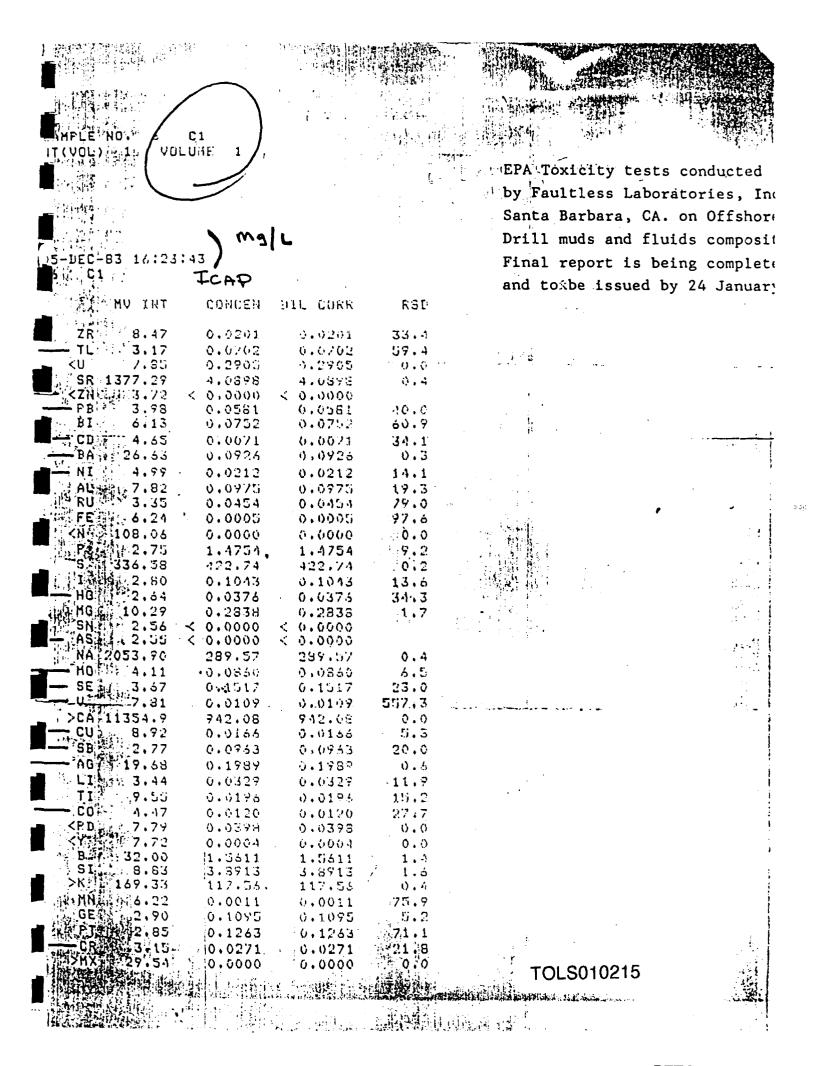
Chemical analysis results of one (1) treated composite extracted according to WET as described in the CAM for Hazardous Waste, August 1981.

	Day	y 2	Day	, 6	Da	y 14	Da	y 30
Element	*Cit	DI	Cit	DI	Cit	DI	Cit	01
Cadmium (Cd)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chromium (Cr)	3.9	1.9	2.6	0.3	3.3	0.3	3.1	1.4
Copper (Cu)	2.3	0.6	3.5	1.7	1.0	0.4	5.0	0.3
Lead (Pb)	< 1	< 1	3	< 1	< 1	< 1	< 1	< 1
Mercury (Hg)	< 0.01	0.2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Vanadium (V)	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Concentrations in  $mg kg^{-1}$  wet weight

\* Cit: CAM Extraction Solution A (2)

DI: CAM Extraction Solution B



# RESEARCH

## 3189D AIRWAY AUE. - COSTA MESA - CALIFORNIA 92626

TEL. (714)751-2945: TWX 910-595-1712

ANALYTICAL REPORT

Solid Analysis

Mr. Tom Wood 571 Pala Ojai, California 93023

Attn: Mr. Tom Wood

Submitted by: Wood, T.

Invoice No.: 830296 Date reported: 1-NOV-83 VR Code: 25904

Dates analyzed:

27-OCT-83 to 28-OCT-83

Sample Description

ID: Composite

Appearance: N/A

Comments: Composite of 9 drilling fluids containing 23.1% solids.

Results

constituent **	ppm.	method	comments
Sodium (Na+)	5050	icp	
Potassium (K+)	1790	icp	
Lithium (Li+)	43.0	icp	
Calcium (Ca++)	5200	icp	
Magnesium (Mg++)	1850	icp	
- Barium (Ba++)	3.3	icp	
Strontium (Sr++)	13.	icp	
Aluminum (Al+++)	5850	icp	
-Silver (Ag+)	<0.01	icp	
- Arsenic (As+++)	1.8	icp	
Gold (Au+++)	<0.04	icp	
Beryllium (Be++)	0.820	icp	
- Cadmium (Cd++)	0.46	icp	
Cerium (Ce+++)	<0.5	icp	
Cobalt (Cc++)	3.30	icp	
- Chronium (Cr+++)	12.3	icp	
Copper (Cu++)	5.46	icp	
Iron (Fe++)	5360	icp	

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80.93

VR Code: 25904

```
Gallium (Ga+++)
                                    <0.3
                                                      icp
  Germanium (Ge++++)
                                    <0.3
                                                      icp
 Mercury (Hg++)
                                     <1.
                                                      icp
Lanthanum (La+++)
Manganese (Mn++)
                                    1.70
                                                      icp
                                    75.0
                                                      icp
Molybdenum (Mo++++++)
                                    <0.3
                                                      icp
- Nickel (Ni++)
                                     2.8
                                                      icp
 - Lead (Pb++)
                                    12.0
                                                      icp
- Antimony (Sb+++)
                                     <2.
                                                      icp
                                    <0.2
- Selenium (Se++++)
                                                      icp
  Tin (Sn++)
                                     8.4
                                                      icp
  Titanium (Ti++++)
                                    302.
 - Vanadium (∀+++++)
                                    22.3
 - Zinc (Zn++)
                                    65.0
                                                      icp
 . Zirconium (Zr++++)
                                    0.66
                                                      icp
Boron (B) ***
                                    16.0
                                                      icp
                                    <0.4
  Phosphate (PO4---)
                                                      icp
  Silica (SiO2)
                                    97.0
                                                      icp
```

N/A= not available ppm and milligrams per kilogram (wet weight) used interchangeably icp= inductively coupled plasma emission; titr= titration

\*\*\* boron is given as ppm elemental boron, but for the purposes of TDS and ion balance, boron is converted to BO3---

# RESEARCH

#### 3189D AIRWAY AUE. - COSTA MESA - CALIFORNIA 92626

TEL. (714)751-2945: TWX 910-595-1712

ANALYTICAL REPORT

Solid Analysis

ATT: Frank Manchak Santa Barbara, CA.

Thomas J. Wood

571 Pala

Ojai, California 93023

Invoice No.: 830296 Date reported:27-DEC-83

Date analyzed:22-DEC-83

VR Code: 26944

Attn:

Tom Wood

Submitted by: Wood, T.

Sample Description

ID: Aqueous Extract

Appearance: N/A

Comments: Average of 2, 4 and 24 days of extraction

Resul ts

constituent **	ppm	method	comments
Barium (Ba++)	7.30	icp	
Silver (Ag+)	0.001	icp	
Arsenic (As+++)	<1.	icp	
Beryllium (Be++)	0.076	icp	
Cadmium (Cd++)	0.16	icp	
Cobalt (Co++)	<0.009	icp	
Chromium (Cr+++)	2.96	icp	
Copper (Cu++)	0.830	icp	
Mercury (Hg++)	<1.	icp	
Molybdenum (Mo+++++)	<5.	icp	
Nickel (Ni++)	2.82	icp	
Lead (Pb++)	3.13	icp	
Antimony (Sb+++)	<2.	icp	
Selenium (Se++++)	<1.	icp	
Vanadium (V++++)	1.22	icp	
Zinc (Zn++)	1.55	icp	

N/A= not available

ppm and milligrams per kilogram used interchangeably

## Pomeroy, Sunston and Bailey Specialists in water and waste technology

29 NORTH OLIVE STREET, VENTURA, CALIFORNIA 93001 + TELEPHONE (805) 648-2735

P.O. Box 30737 Santa Barbara, CAL 193105 Lab. #V75342 V75363

Attention: Mr. Manchak

Laboratory analysis of five (5) samples, identified as below, received in this laboratory April 22 and 29, 1975.

Sample #1, Big Sump, received April 22

Oil and Grease 491 mg/kg Sulfate 0.12 mg/kg 2.45 mg/kg Phenol

Sample #2, Palomar, received April 22

Oil and Grease 528 mg/kg 0.13 mg/kg Sulfate Phenol 0.56 mg/kg

Sample #3, received April 22

Oil and Grease 213 mg/kg Sulfate 0.39 mg/kg Phenol less than 0.01 mg/kg

Champlin Big Sump, Test No. 1, Untreated, received April 29

29,788 mg/kg Sediment Oil and Grease

Champlin Polymer, Test No. 2, received April 29

Sediment Oil and Grease 20,851 mg/kg

Respectfully submitted,

POMEROY, JOHNSTON & BAILEY

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A Divison of Jacobs Engineering Co.



#### 1775 CALLENS ROAD, VENTURA, CA 93003 + 805/644-1095

June 24, 1981

Job Number: C1-1100-C01

Lab Number: 815262

ATTENTION: Frank Manchak

REGARDING: Leachate and Acid Digest on Raw and Treated Samples

Dear Mr. Manchak:

The samples of waste were submitted to us in a sealed-unopened shipping container by Federal Express (Air Bill #430225515) on May 1, 1981. The container was opened and the samples were removed for leachate analysis per your specifications. The samples were leached in accordance with proposed ASTM Method D19:12. The aqueous portion was then used for the appropriate analysis. The results are as follows:

Sample No.	Leachate PCB's	(ppm)	Total PCB's	(ppm)
I II	< 0.02 < 0.02		110	
III	< 0.02		-	
Constitutent (mg/L)	Raw Composite (acid digest)	Run #8 (leachate)	Run (#10) (leachate)	Run #11 (Teachate)
Arsenic	< 0.25	< 0.1	< 0.1	< 0.1
Barium	< 1.0	< 1.0	< 1.0	< 1.0
_ Cadmium	1.92	< 0.05	<0.05	< 0.05 in the second
Chromium	372	57.5	学题"50	37.5
Mercury	< 0.005 <sub>55%</sub>	< 0.01	< 0.01	< 0.01
Lead	2700	< 0.1	< 0.1	< 0.1
: Selenium	< 0.1	< 0.1	< 0.1	< 0.1
Silver	0.24	< 0.05	< 0.05	< 0.05

Respectfully submitted;

BTC LABORATORIES

R.K. Sextro
Chem Lab Supervisor

RKS:hra

SANTA BARBARA (805) 968 9912 THOUSAND OAK (805) 497-2401





Pay 12, 1981

#### LABORATORY REPORT

#7572

#### "SUMMARY SHEET OF ANALYTICAL DATA"

Dr. Hilton Necker Immnologic Diagnostics 6640 d. Western Avenue Chicago. Illinois 60645

Sample received April 29, 1981

Att: Mr. Frank Manchak	Sample Raw	Ru	ns#		
[TEI-12267.01] Sample #8 Nichols-Homeshield	# 8	1.		EPA	
EP Toxicity					
Arsenic, mg/l	< 0.002	<b>≺</b> 0.002	0.01	5.0	
Barium, mg/l	1.3	1.2	1.4	100.0	
Cadmium, mg/l	0.06	0.06	₹0.05	1.0	
Chromium, mg/l	. 139	9.2	5.6	5.0	
Copper. mg/l	0.2				
Lead, mg/l	1.6	0.5	0.2	5.0	
Hercury, mg/1	< 0.01	<0.01	<0.01	5.0	
lickel, mg/l	0.3		4		
Selenium, mg/l	0.02	0.02	< 0.05	1.0	
Silver, mg/l	0.07	0.02	0.07	5.0	
Zinc, mg/l	0.1	0.07	0.07	5.0	
Sample preparation	8	1:	3	EPA limi	
nation		ug/l	_ug/l_	_mg/1	
Lindane(ppb or = ug/1.)	-	0.069	0.001	0.4	
PCB (1254,1242; Aroclor) ppb		0.022	0.0508		
Toxapheneppb		0.040	0.537	0.5	
Endrinppb	•	0.006	0.202	0.02	
Methoxychlorppb	•	<0.01	< 0.01	10.0	
2,4-D Dichloro ppb		< 0.01	<0.01	10.0	
2,4,5-Trichloro phenylprop.ecidppb		< 0.01	< 0.01	1.0	
The organic compnds assayed for are from limits noted on this page by the EPA.	100 to 1000	c below	the accept	able toxi	

# Quad City Frater Treatment Company

## Environmental Testing Services P. Q. Box 536

July 1, 1981

LeClaire, Iowa 52753

Mr. Don Hobbs

422 Pershing St. Davenport, Iowa 52801

The following are test results from Nichols-Homeshield tube settler sludge.

Total Solids Percent Ash Residue 0.95%

TESTS	TOTAL DIGESTION MG/L	E.P. TOXICITY MG/L
Arsenic	<0.01	< 0.01
Barium	< 0.05	₹ 0.05
Cadmium	3.4	< 0.01
Total Chromium	98 0	0.50
Hex Chromium	• •	0.42
Copper	0.32	< 0.01
Cyanide	<0.01	< 0.01
Lead	0.66	0.53
Mercury	< 0.001	< 0.001
Nickel	0.84	- 0.04
Selenium	< 0.01	< 0.01
Silver	< 0.01	< 0.01
Zinc	3.3	0.03
Phenols	•	< 0.02
Fluoride		0.06
Nitrates	•	< 0.50

If you any questions, please give me a call.

Sincerely

Robert B. Black

Environmental Chemist

RBB/rbb cc:file

Mr. Frank Manchak Jr. Santa Barbara, CA

## Quad City Water Treatment Company

Environmental Testing Services

July 22, 1981

P Q Box 536

LeClaire, Iowa 52753

CONFIDENT INFORMATION

Mr. Bob Kettering Nichols-Homeshiels P.O. Box 3808 Davenport, Iowa 52808

The following are test results on unprocessed and processed waste sludge samples dated 7-10-81.

TESTS	TOTAL UNPROCESSED mg/l	E.P. TOXICITY PROCESSED mg/1	TOTAL UNPROCESSEDmg/l	PROCESSEDmg/1
Arsenic	<b>&lt;1</b>	< 0.01	<1	< 0.01
Barium	446	2.8	< 1	< 0.05
Cadmium	6.0	0.01	2.0	< 0.01
Total Chromium	44400	2.3	1578	2.5
Hex Chromium		0.29		1.02
Copper	<b>30</b> . ,	0.01	15	0.06
Cyanide	. <1	<0.02	< 1 .	< 0.02
Lead	239 .	0.24	333	1.6
Mercury	<1	< 0.001	<i>(</i> 1	< 0.001
Nickel	۷ 1	₹ 0.01	< 1	< 0.01
Selenium	<b>&lt;</b> 1	< 0.01	<b>&lt;</b> 1	< 0.01
Silver	<b>ረ</b> 1	<0.01	< 1	< 0.01
Zinc	2063	0.99	648	0.33
Phenols		< 0.02	•	<b>८</b> 0.02
Fluoride		۷ 0 . 0 4		< 0.04
Nitrates		۷ 0.50	. •	<b>4</b> 0.50

cc: Frank Manchak Santa Barbara, CA

CONFIDENTIAL INFORMATION

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## Quad City Water Treatment Company

## Environmental Testing Services P. Q. Box 536

January 26, 1981

LeClaire, Iowa 52753

Mr. Bob Kettering Nichols-Homeshield P.O. Box 3808 Davenport, Iowa 52808

The following are test results from Nichols' waste water treatment plant sludge.

Total Solids 23.69% by weight

TESTS	MG/L per wet weight	PPM Dry weight	MG/L E.P. Toxicity
Arsenic	<0.01	<b>∠</b> 1	<0.01
Barium	1.3	5.5	0.22
Cadmium	0.04	0.17	< 0.01
Total Chromium Tri Chromium Hex Chromium	5.87	24.8	1.3 0.7 0.6
Lead	0.24	1.01	0.30
Mercury	< 0.001	<0.001	< 0.001
Selemium	<0.01	<b>&lt;</b> 1	< 0.01
Silver	€ 0.01	<b>c</b> 1	<b>∠</b> 0.01
Cyanide	د 0.01	< 1	< 0.01
Copper	7.2	30.4	0.36
Zinc	76	321	2.6

Copy:

Mr. Frank Manchak Jr. Santa Barbara, CA.

Robert B. Black Environmental Chemist

ID	Description of waste	Rationale for listing as hazardous waste	Other waste characteristic (total)	final composition of leachate
CACI 4	Latex paint sludge D009	EP Toxic for Mercury (listed waste)	pH 7-9 flashpoint - none	pH 12.3 Sp Conductance 9270 umh Hg - 5ug/l
CYCI 6	milling waste	EP toxic for Selenium?	pH 5-7 sulfate 50-200 g/l copper 509 mg/l molybdenium 100-300 mg/l selenium 0-10 mg/l zinc 5-15 mg/l	pH 12.4 sulfate 1.7/g/l copper .07 mg/l moly 12 mg/l nickel * (K).1 mg/l selenium .1 mg/l zinc (K) .01 mg/l Sp Conductance 11,100 u:
CACI B	Electroplating waste F006	EP toxic for chromium (listed waste) (leachate 0-10 ppm)	pH 9-13 chromium 100-10,000 mg/l copper 5-1,000 mg/l nickel 2,000-200,000 mg/l Zinc 10-100 mg/l	pH 4.4 chromium (total) .012 m copper .007 mg/l nickel .7 mg/l Zinc .011 mg/l
CACI 10	Petroleum refinery wastes	corrosive pH 1.5  Ignitables? F.P. 140°F	chromium .45 leachate	pH 12.4 Sp conductance 13,100 umhos chromium 1.09 ppm

<sup>\*</sup> K - means less than

Buena Engineers, Inc.



1731.A WALTER STREET . VENTURA, CALIFORNIA 93003 . PHONE (805) 642.6727

December 27, 1982

82-12-187 B-13120-V1

Jacobs Environmental 29 N. Olive Ventura, CA 93001

RE: Permeability Tests of Hazardous Wastes

Gentlemen:

As requested, we have performed permeability tests on the two samples of hazardous material supplied to our office by Mr. Frank Mancheck. These samples were molded by Mr. Mancheck, then brought to this office for testing, and were labeled samples A and C.

Sample A appeared to be permeable, however inspection of the sample showed that some shrinkage of the sample had occured prior to testing, and the water was flowing around the sample rather than through it. Sample C showed no flow for the entire period of testing, and is classified as non-peremable.

Please do not hesitate to contact us if you have any other questions.

Respectfully submitted,

BUENA ENGINEERS, INC.

Reviewed and approved

Raymond E. Brannen

CE 28966

Norman G. Hallin

CE 7370

REB/NGH/nan

Copies:

THOUSAND OAKS

(805) 495-8484

2 - Jacobs

1 - VTA file

TOLS010226

VENTURA (805) 642-6727 LANCASTER (805) 948-7538

BAKERSFIELD (805) 327-5150 SANTA BARBARA (805) 966-9912 PALM SPRINGS (714) 328-9131 SAN LUIS OBISPO (805) 544-6187

BZTO104(e)047059



1775 CALLENS ROAD, VENTURA, CA 93003 • 805/644-1095

December 1, 1978

Job Number: C8-1634-C01

Ecology Products, Inc.
Post Office Box 2007
Santa Barbara, California 93120

#### Gentlemen:

You have asked us to summarize our overall reaction as to the effectiveness of the Manchak processes for stabilization and solidification of sludges.

BTC Laboratories is a State of California certified Water Laboratory - Chemical, that has been operating in the environmental field for the past six years. A service offered by this laboratory is certified testing, i.e. this laboratory will conduct experiments, under the guidance of its client, so that the exact input to and results from specified tests can be verified and substantiated analytically. Over the past two years, we have conducted certified tests with and analyzed constituents from numerous sample lots of municipal and identical sludges from sources throughout the United States. These sludges were treated either by BTC Laboratories in certified test sequences, or by Ecology Products using the aforementioned Manchak processes.

After analyzing the results from the various tests and analysis of reacted sludge or sludge leachate from at least eight different sources, both municipal and industrial, we have arrived at the following conclusions relative to your processes and the sludges thus far tested:

- The Manchak processes effectively destroys all fecal coliform

   present in the sludges and reduces coliform by a factor of five orders of magnitude.
- 2. The Manchak processes effectively eliminates the objectionable odors associated with municipal sludges. The process also noticeably alters the character, intensity and odors from industrial sludges.
- 3. The Manchak processes appear to be able to solidify any sludge that contains sufficient water to react with the amending chemicals added in the mixing process. A <u>purely</u> organic sludge may not be solidifiable with the Manchak processes.
- 4. The reacted sludge from the Manchak processes does not leach with deionized water to any great degree. Heavy metal

SANTA BARBARA (805) 966-0912 THOUSAND OAKS (805) 407-2401

reductions from 86% to 99.9% have been obtained during certified testing. Very low concentrations of various organic pesticides and chemicals have been found in the leachate from reacted sludge reportedly containing much higher concentrations.

5. The reacted sludge from the Manchak processes appears to be suitable for engineering fill, though this laboratory did not perform the necessary analysis to substantiate this.

BTC Laboratories feels that the Manchak processes significantly improves the character of the sludge thus far tested and that this approach appears to have great merit in dealing with sludge stabilization and solidification. It is our hope that the Manchak processes will be of assistance in reducing, and possibly entirely eliminating the hazards now associated with conventional sludge storage or disposal.

Respectfully submitted,

BTC LABORATORIES

Tom Porter

Chemical Laboratory Supervisor

TP:ts



1775 CALLENS ROAD, VENTURA, CA 93003 - 805/644-1095

Job Number: C7-1634-C01 Lab Number: 765175

Mr. Frank Manchak Jr.

P.O. Box 30737

Santa Barbara, California 93109

ATTENTION: Mr. Frank Manchak

REGARDING: Certified Test Data and Analysis Summary

Dear Mr. Manchak:

You have asked me to summarize and present in non-proprietary terms, the salient information obtained from certified testing of the M.C.I. sewage sludge processing system conducted by BTC Laboratories on June 25 & 26, 1977 and reported by us in our report of July 26, 1977. Mr. DeFriez with Innovative Design Engineering then performed a detailed data analysis and reported same in his letter of October 5, 1977. I have reviewed our report and read and understood Mr. DeFriez's letter; the information presented here, while not specific in areas of proprietary interest, is completely supportable by the two documents reference above.

For M.C.I. sewage sludge product (SSP) obtained by thoroughly mixing a specific minimum or more M.C.I. amendment chemical to biologically generated, municipal sewage sludge, the following appears to be correct for this series of tests:

- The SSP displayed 100% kill of fecal coliform and at least five orders of magnitude reduction of coliform bacteria (with 100% kill of 21 of 23 tests). The effectiveness of kill was not dependent on either the amount of amendment chemical added or the temperature rise associated with adding amendment chemical to sewage sludge.
- 2. Upon discharge from the mullor chamber, the odor from the SSP was strong in ammonia; the ammonia dissipated rapidly, leaving an SSP odor similar to heavy, wet soil. The odor was not objectionable.
- 3. Using a severe leach test, four heavy metals were extracted from the SSP: the maximum amount leached was 14% of the nickel (59 mg/kg), the least leached was

SANTA BARBARA (805) 966-9912

THOUSAND OAKS (805) 497-2401 0.1% of the zinc (4.2 mg/kg). The amount of amendment chemical added had no effect on the degree of leaching.

- 4. Of eight other chemical or biochemical constituents leached from the SSP, all, except alkalinity, showed reductions when compared to solid sludge. The amount of amendment chemical added appeared to have no significant effect.
- 5. The energy necessary to mix the amendment chemical with sewage sludge is directly proportional to the amount of amendment chemical added. This parameter is suitable as the major control function and will greatly simplify amendment chemical addition. Similarly, the density and viscosity of the SSP are proportional to amendment chemical addition; ranging from a low of 72 lb/ft<sup>3</sup> and the consistency of yogurt to 75 lb/ft<sup>3</sup> and the consistency of plumbers putty at intermediate additions.

Additional testing with any specific sludge will be necessary before the above conclusions can be assumed valid for that sludge.

Respectfully submitted,

BTC LABORATORIES

Tom Porter

Chemical Laboratory Supervisor

TDP:tls



# NEW PROCESS ENCAPSULATES HAZARDOUS WASTE

bу

James J. Mueller President of Controls for Environmental Pollution, inc.

Compliments of:

CONTROLS FOR ENVIRONMENTAL POLLUTION, INC.

1925 Rosina Street

Post Office Box 5351

Santa Fe, New Mexico 87502

(505) 982-9841

1-800-545-2188

## New Process Encapsulates

#### JAMES J MUELLER

A new chemical process has been developed by Sludgemaster Inc. which solidifies and encapsulates wastes, rendering them environmentally stable. The process mixes a slurry with select chemicals that solidify it into a 90 percent solid end-product. The select chemicals used in the solidification process are proprietory information.

Sludgemaster, Inc. contracted Controls for Environmental Pollution, Inc. (CEP) to evaluate the process wastes for uranium mill tailings, transformer oil and refinery sludge. This article presents CEP's technical evaluation of the encapsulation process. At this time, only preliminary data is available; however, CEP feels the very positive results indicate that the process is effective. More testing, however, is needed to substantiate this data.

CEP and Sludgemaster personnel visited three sites in February 1982 to process wastes for analysis in CEP's laboratory. At two uranium mill tailings ponds in the Grants, NM area, they processed slurry tailings from an acid-leach pond and a basic-leach pond. For each processed sample, an equivalent amount of unprocessed slurry sample was also collected. The processed sample is also referred to as the encapsulated or solidified sample, while the unprocessed sample is referred to as the slurry or sludge. CEP and Sludgemaster personnel also collected processed and unprocessed samples from a refinery sludge pit in Texas and transformer oil from a midwestern industrial company.

#### **Uranium tailings**

In the technical evaluation, CEP attempted to accomplish two objectives: (1) determine what, if any, reduction occurred in Radon-222 emanation in the processed and unprocessed uranium mill tailings and, (2) determine what leaching occurred when the solidified tailings, refinery sludge and transformer oil were subjected to variable environmental conditions.

To determine Radon-222 reduction, samples of the processed and unprocessed uranium mill tailings were analyzed by direct and indirect methods. The direct method analyzed Radon-222 gas build-up in enclosed canisters over a period of time. The indirect method measured Radon-222 daughter products.

The following environmental-simulation tests were performed in order to determine how the environment might affect the solidified product: (1) EP Toxicity on the solidified tailings, the refinery sludge and transformer oil (EP-Toxicity procedure "ASTM Method, D19:12"), (2) acid leachability test simulating acid rain on the solidified tailings (0.5N H<sub>2</sub>SO<sub>4</sub>, sulfuric acid), (3) 100% Hexane leach test on the transformer oil, (4) a variable-temperature test to simulate temperature ex-



tremes on the uranium mill tailings. The leachate produced from these tests was analyzed for trace metals, PCB's, or radioactivity.

CEP analyzed for Radon-222, Radium-226, Lead-214, and Bismuth-214 using the Gamma Spectrometric Counting Technique. CEP also determined Total Radon emanation with an Alpha Scintillation Counting Technique. Uranium concentration was determined by Flurometric and Radiometric methods of analysis. To analyze for trace metals, CEP used the Inductively Coupled Plasma (ICP) and AtomicAbsorption Spectrometry (AA) Techniques. PCB concentration was determined using the Gas Chromatography Technique.

#### **Test Results**

The average values of Radon-222 emanation reduction obtained as a result of encapsulation of the slurry tailings are shown in Table I (Alpha Scintillation Technique). Table I also presents the results of the relative percent reduction of Radon-222 determined through short-lived Radon daughters (Gamma Spectral Technique). Numbers A1 through A4 represent solidified samples from the uranium tailings pond that used an acid leach, while those numbered B1 through B4 are samples from the basic-leach Uranium tailings pond. The average Radon-222 emanation reduction for both ponds is 93.51 percent after encapsulation. The average reduction for acid leach tailings is 93.42 percent, while that of the basic-leach tailings is 93.60 percent. When the samples were allowed to build up Radon gas and reach secular equilibrium over a time period between 12 and 336 hours, the percent Radon reduction remained relatively the same. Within this time, gases like Radon-220 (Thoron, 54.5 Sec 11/2) and Radon-219 (Actinon, 3.9 Sec t1/2) do not contribute to the activity measurement because of their short half-lives. The longer period of build up did not show any significant difference in relative percent reduction, because Radon-222, being in the Uranium (4n+2) decay series, was being generated as the short-lived daughters were decaying.

Uranium concentration results in Table 2 show that there is a greater uranium concentration of 10.4% in the solidified uranium tailings than in the slurry. This demonstrates the Sludgemaster process does not dilute uranium concentration.

Radium-226 concentration in the leachate was determined by the Gamma Spectral Technique. Results indicate that the leachate from the EP-Toxicity method showed non-detectable concentration (less than 0.6 pCi/l) of Radium-226, while the leachate from the acid rain experiment (0.5N H<sub>2</sub>SO<sub>4</sub>) showed 2.39±0.25 pCi/l Radium-226 (See Table 3). Based on the EP-Toxicity method, leachable Radium-226 from the encapsulated

## TABLE 1. Solidification of Uranium Tailings—Radon-222 Reduction ALPHA SCINTILLATION TECHNIQUE

Time for	SOLIDIFIED	% Reduction
Sample # Equilibrium	- 在2018年3月12日	of Radon-222
A-1 12 hours	$5.50 \times 10^2$ $6.87 \times 10^3$	92.00
A-2 3 days	$2.50 \times 10^{2}$ $3.98 \times 10^{3}$	93.72
A-3 7 days	$6.00 \times 10^{2}$ 3.3. $8.50 \times 10^{3}$	92.94
A-4 2 weeks	3.90 × 10° 3.90 × 10° 3.50 × 10°	95.00
B-1 12 hours	$4.00 \times 10^{2}$ $5.40 \times 10^{3}$	91.48
B-2 3 days	4.00 × 10 <sup>-2</sup> 8.10 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.50 × 10 <sup>-2</sup> 4.	95.06
B-3 7 days-	2.80 × 10 × 4.98 × 10 × 10 × 10 × 10 × 10 × 10 × 10 × 1	93.47 94.38
P-4 - Apple Service - 2 Weeks		
a distribution of the second	Mean	93.51
		Contract of the
	GAMMA SPECTRAL TECHNIQUE	
	(Intrinsic (HPGE) Detector 23% Eff)	
Sample# Isotope	我们的表现在,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1997年,1	% Reduction
	5.44 × 10 <sup>2</sup> pCi/gm 2.36 × 10 <sup>3</sup> pCi/gm	76%
- 1 においます (1994) - 1 により (1994) -	7.58 × 10 <sup>2</sup> pCi/gm	66%
A-1 Bi-214 <sup>(a)</sup>	9.80 × 10° pCi/Total 9.80 × 10° pCi/Total	90%
•	a metal can for 12 hours to reach secular equilibrium.	
(h) After reaching secular equilibri	ium (12 hours), the gas was transferred to a counting cell.	e fragisk og skriver Billioner i det skiller og er
	and the state of t	reconstruction of the second

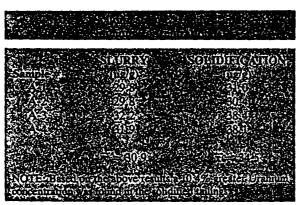


TABLE 3—Leach Studies Uranium Tailings

Analysis -	Radium-226
Slurry	$(1.97\pm0.002)10^3$ pCi/gm
Solidified	(5.57±0.005)10 <sup>2</sup> pCi/gm
Solidified**	ા અમાનું અમુકુતમ્ મેક્સ્ફુનું સુકી ક
<b>EP-Toxicity</b>	<0.6 pCi/l
Solidified	
Acid Rain* Leach	2.39±0.25 pCi/I
	ry the state of th

<sup>\*</sup>Simulation of Acid Rain when the atmosphere has significant concentration of sulfur dioxide. Samples were therefore leached in 0.5N H<sub>2</sub>SO<sub>4</sub>.

material would be very low. However, acid rain conditions (rain or moisture above 0.5N H<sub>2</sub>SO<sub>4</sub> concentration) could cause a small amount of Radium-226 leaching into the surrounding soil.

An 85 percent Radon-222 reduction was observed in a sample that was allowed to reach secular equilibrium at a temperature below freezing point (0C) for 12 hours (see Table 4). Another sample was allowed to reach secular equilibrium at an elevated temperature of 40C for 12 hours. When de-emanated, Radon-222 reduction was 93.05 percent. The percent Radon-222 emanation reduction of the solidified material compares favorably to the data presented in Table 1.

Table 5 shows the concentration of trace metals in the leachates and the unleached solidified sample. Ten elements were analyzed by using Inductive Coupled Plasma Spectroscopy (ICP). A total digestion of the solidified uranium tailings sample was analyzed and results compared to the leach extracts. The total iron concentration in the solidified sample was 14,900 ug/gm, while the leach extracts from both the EP-Toxicity method and the sulfuric acid leach showed a concentration less than 0.1 mg/l. Vanadium showed a total of 520 ug/g (solidified sample) and less than 0.1 mg/l in both leachates. Barium was the next highest with a total of 360 ug/g (solidified sample) and less than 0.1 mg/l in both leachates. The leach indicates that the solidification process is successful in encapsulating toxic metals in the solidified uranium tailings.

leached in 0.5N H<sub>2</sub>SO<sub>4</sub>.

\*\*Normal leaching process with 0.5 N Acetic Acid (ASTM D19:12 Method).

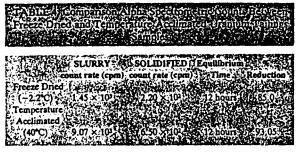
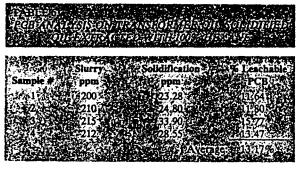


TABLE 5. Leach Studies Solidified Uranium Tailings

	SOLIDIFIED Tailings	EP-TOXICITY*	ACID RAIN**
Analysis	ug/gm	mg/l	mg/l
Arsenic	75	0.6	0.3
Barium	360	< 0.1	< 0.1
Cadmium	< 10	< 0.1	< 0.1
Chromium	< 10	< 0.1	< 0.1
Iron	14,900	< 0.1	< 0.1
Lead	< 10	0.2	< 0.1
Molybdenum	< 10	< 0.1	< 0.1
Selenium	< 10	< 0.1	0.1
Silver	< 10	< 0.1	< 0.1
Vanadium	\$20	< 0.1	< 0.1

\*Simulation of Acid Rain when the atmosphere has significant concentration of sulfur dioxide. Samples were therefore leached in 0.5N H2SO4.

\*\*Normal leaching process with 0.5N Acetic Acid (ASTM D19:12 Method).



#### **PCBs**

An investigation was also made on the effect of the encapsulation process on waste transformer oil obtained from a midwestern industrial company. Table 6 shows the results obtained for the concentration of PCB's before and after solidification. PCB slurry concentration ranged from 200 to 215 ppm, and in the solidified oil, PCB concentration ranged from 23 to 33 ppm. The average percent leachable PCB, when extracted in 100 percent Hexane, was found to be 13.17 percent. The EP-Toxicity test indicated less than 0.02 ppm PCB in the leachate. The preliminary results of this investigation show that by using the encapsulation process the concentration of PCB's is reduced in the leachates.

#### **Heavy Metals**

The concentration of heavy metals was determined in the processed and unprocessed refinery sludge sample obtained from a refinery company. CEP analyzed the unprocessed sludge using a total dissolution method and the solidified end-product by EP Toxicity. Results indicate that the concentration of heavy metals in the EP-Toxicity leachate was significantly lower than the concentration of the heavy metals in the sludge as shown in Table 7. Arsenic showed a concentration of 15.70 ppm before solidification and less than 0.010 ppm from the EP-Toxicity leachate after solidifiction. Chromium concentration was leachate after solidification. The process of solidifying refinery sludge was successful in substantially reducing heavy metals in the leachate. It can be assumed that since the EP-Toxicity extract or leachate does not show concentration of metals above the set guidelines by the U.S. EPA as stated in 40 CFR, 261.24 that solidified refinery sludges could be considered non-hazardous waste.

TABLE 7
Comparison of Refinery Sludge
Leachability Characteristics

Heavy	Concentration* before	EP-Toxicity after
Metals	solidification, ppm	solidification, ppm
Arsenic	15.70	< 0.010
Barium	3.60	< 0.100
Cadmium	2.00	< 0.001
Chromium	19.00	< 0.001
Lead	1.33	< 0.001
Mercury	0.05	< 0.0004
Selenium	0.24	< 0.01
Silver	5.33	< 0.01

#### Conclusions

The results of the various aspects of this study indicate that the encapsulation process is not only capable of reducing the percent of Radon-222 emanation but also reduces the possibility of the leaching of toxic elements. Radon-222 emanation after solidification showed a 93.51% reduction from the slurry. The Gamma Spectral Analyses of short-lived Radon daughters supported the above findings.

Leach studies on solidified refinery waste and transformer oils indicate there is a significant reduction in the possibility of toxic substances leaching out of the solidified samples. Further studies are needed to confirm the results of this investigation; however, the present findings indicate that the process could substantially reduce Radon-222 exhalation into the environment from uranium tailings ponds and reduce toxic leachates from hazardous waste materials.

James J Mueller is employed with Controls for Environmental Pollution, Inc., Santa Fe, New Mexico.

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Pacific Northwest Laboratories P.O. Box 999 Richland, Washington U.S.A. 99352 Telephone (509)

Telex 15-2874

September 8, 1981

Ray Behrens Sludgemaster, Inc. 1650 Chambers Rd. Suite 104 Aurora, CO 80011

Dear Ray:

Enclosed find a letter report by J. Tingey describing the Sludgemaster tests run on 13 and 26 Aug. 1981. The observations indicate that for the first day test, the flux reduction (compared to bare tailings) was about 80%, likely due to the high water content in the sludgemaster treatment. After one week the treated material had hardened and the flux was reduced by about 85% (compared to bare, untreated tailings). On both test dates the flux from the treated tailings was over 10x the 2 pCi  $\rm m^{-2}$  sec-l limit set by NRC. Additional conditioning will be required to meet the low flux limit set by NRC. We have estimated that flux reductions on the order of 99 to 99.5% will be required to reduce the "hottest" tailings to the 2 pCi  $\rm m^{-2}$  sec-l limit. Your material indicate some promise but a great deal of testing would be required to show satisfactory compliance with the present NRC guidelines.

Sincerely,

G.W. Gee

Staff Scientist

Earth Sciences Section

Water and Land Resources Department

GWG/sr/21



STATE OF WASHING

#### DIPARIMINT OF SOCIAL AND HINLTH SERVICES

Oh mpia, Washington 9850-

January 24, 1983

Donald A. Barbour-Nuclear Metals, Inc. 2229 Main Street Concord, Massachusetts 01742

Dear Mr Barbour:

In reference to your letter of October 22, 1982, requesting permission to use the Sludgemaster system, it appears that all criteria for solidification of a liquid are adequately satisfied.

Several of the test containers shipped to the disposal site at Hanford were examined and in all cases found to be within acceptable limits for solidified liquids established by the Department of Transportation and the state of Washington. Therefore, the sludgemaster process is hereby allowed for use by Nuclear Metals, Inc., for solidification of low level nuclear wastes which are to be deposited at the low level nuclear disposal site, Hanford, Washington.

The diligence with which you have pursued the acceptance of the Sludgemaster Process for use as solidification media is very commendable and is much appreciated by the department. Thank you for your cooperation.

Sincerely,

E. Lee Gronemyer, Manager Radioactive Waste Program

Norman J. Stewart Radiation Control Monitor

ELG: NJS:ds

c: US Ecology, Louisville, Kentucky
US Ecology, Hanford, Washington

# OBSERVED REDUCTION OF RADON-222 GAS EMANATION FROM URANIUM TAILINGS USING A NEW CHEMICAL ENCAPSULATION PROCESS

Anselm U. Emeanuwa, James J. Mueller and John D. Ritts

Controls for Environmental Pollution, Inc., Santa Fe, New Mexico

#### **ABSTRACT**

One of the most controversial radiological contaminants in the environment is Radon-222. Presently, uranium tailings (a major source of Radon-222) are stored in confinement dams under several feet of liquid in order to contain the Radon gas and eliminate its emission to the atmosphere. This method presents a hazard to the environment because of possible ground water contamination, and it creates a water resource problem in water-scarce areas. A method has recently been developed that contains and reduces Radon-222 gas emanation from uranium tailings ponds. This method uses a chemical process in which Radon-222 is encapsulated by solidification of uranium tailings slurry.

During evaluation, equal amounts of both the unprocessed and processed slurry were allowed to reach secular equilibrium in a sealed container. The built-up gas was then de-emanated and analyzed for Radon content using two proven radiochemical methods. Based on these radiochemical methods, the process under consideration indicated greater than 92% reduction in Radon-222 gas emanation.

Other methods of reducing Radon emanation are discussed in this presentation. Research for additional application of this process is recommended.

<sup>\*</sup>Paper was presented at the International Congress on Technology and Technology Exchange, Pittsburgh, Pa., May 4, 1982.

#### DECAY SERIES OF RADON-222

Sill, C.W. (1969) reported that in the processing of Uranium ores, the radioactivity of the tailings material averages 700 pCi/g for each nuclide in the Uranium chain. He estimated that by the end of the 1970's there would be approximately 90 million tons of Uranium tailings or 58,000 Ci of each nuclide and over 125 lbs. of Radium-226.

It is estimated that bronchial exposure from Radon-222 amounts to 13.8 rad/yr from a concentration of 10.1 pCi/l. In Sill's investigation of four (4) different tailing sites, a total of thirty-six (36) samples analyzed for Radon-222 showed concentrations ranging from 5.6 pCi/l to 38.3 pCi/l. These concentrations exceed the maximum permissible concentration (MPC) of 3 pCi/l permitted by Federal Regulations for continuos exposure to the general public in uncontrolled areas.

Although many techniques for measuring Radon-222 exhalation rates have been reported, they cannot be applied to active tailings ponds because of the fluid cover (Hans 1977). The tailings at a mill are placed in an impoundment below several feet of liquid in order to reduce radioactive emanation. Franklin, et al.

sample was collected. In this paper, the processed sample is also referred to as the encapsulated or solidified sample, while the unprocessed sample is referred to as the slurry or sludge. CEP and Sludgemaster personnel also collected processed and unprocessed samples from a refinery sludge pit in Texas. A midwestern industrial company submitted processed and unprocessed samples of transformer oil.

#### Methods Of Analysis

In the technical evaluation, CEP attempted to accomplish two objectives: 1) to determine what, if any, reduction occurred in Radon-222 emanation in the processed and unprocessed uranium mill tailings and 2) to determine what leaching occurred when the solidified tailings, refinery sludge, and transformer oil were subjected to variable environmental conditions.

To determine Radon-222 reduction, samples of the processed and unprocessed uranium mill tailings were analyzed by direct and indirect methods. The direct method analyzed Radon-222 gas build-up in enclosed canisters over a period of time. The indirect method measured Radon-222 daughter products.

The following environmental-simulation tests were performed in order to determine how the environment might affect the solidified product: 1) EP Toxicity on the solidified tailings, the refinery sludge, and transformer oil, 2) acid leachability test simulating acid rain on the solidified tailings, 3) 100% Hexane leach test on the transformer oil, 4) a variable-temperature test to simulate temperature extremes on the uranium mill tailings. The leachate

#### Gamma Spectrometric Technique

CEP placed duplicate samples of processed and unprocessed sludge in tightly sealed containers specifically designed for Gamma counting. The containers were allowed to build up Radon-222 for twelve (12) hours. The container was then counted on the Gamma Spectrometer. An Intrinsic High Purity Germanium Diode (23% Eff) detector was used in the counting. The Gamma Spectrometric analysis determined the concentration of Radium-226, Lead-214, and Bismuth-214.

After Gamma Spectrometric counting, the gas was then transferred to a 100 cc GA-MA Radiogas container and the gas portion counted for Bismuth-214 daughter product.

#### EP-TOXICITY AND ACID LEACH METHODS

#### **EP-Toxicity**

Twenty-gram aliquots of the processed and unprocessed samples were placed in 500 ml plastic containers. A 0.5 N (CH<sub>3</sub>COOH) Acetic Acid was used to lower the pH to 5.2. (EP-Toxicity procedure "ASTM Method, D19:12"). The samples were allowed to tumble and mix for twenty-four (24) hours, after which the leachate was collected by filtration through a millipore under nitrogen pressure.

#### Sulfuric Acid Leach (Acid Rain Simulation)

This is done exactly as the EP-Toxicity method described above with one exception,  $0.5 \, \underline{N}$  (H<sub>2</sub>SO<sub>4</sub>) sulfuric acid was used to do the leaching and lowering of the pH. This was done to simulate acid-rain leaching. CEP performed a Radiochemical Analysis on the filtrate to determine Radium-226 concentration.

(Actinon, 3.9 Sec th) do not contribute to the activity measurement because of their short half-lives. The longer period of build up did not show any significant difference in relative percent reduction, because Radon-222, being in the Uranium (4n+2) decay series, was being generated as the short-lived daughters were decaying.

Table I illustrates the percent Radon-222 reduction from Lead-214 and Bismuth-214, which are Radon daughters in equilibrium with Radon-222. This data was obtained using the Gamma Spectral Technique which utilizes an intrinsic high purity germanium diode detector. The results show a 76% reduction of Lead-214 and a 66% reduction of Bismuth-214 in the solidified sample. A 90% reduction in Bismuth-214 was also obtained using a slightly different analytical technique, as shown in Table I. These results are in agreement with the work of Countess, R.J. (1976), in his investigations of Radon-222 flux with charcoal canisters. He reported that Radon flux from the surface of a Uranium mill tailings pile was about 1.2 x 10<sup>6</sup> pCi m<sup>-2</sup> min<sup>-1</sup>. Radon flux, he noted, will increase to approximately two-thirds of its maximum accumulation in a canister in six (6) days and that little will be gained by longer exposures. The results of the investigation of Franklin, et al. (1975), in which polymeric materials were used to seal Radon-222 in the walls of a Uranium mine, are also in agreement with the results of this investigation.

Uranium concentration results given in Table II show that there is a greater Uranium concentration of 10.4% in the solidified Uranium tailings than in the slurry. This demonstrates the Sludgemaster process does not dilute Uranium concentration.

Radium-226 concentration in the leachate was determined by the Gamma Spectral Technique. Results indicate that the leachate from the EP-Toxicity method showed non-detectable concentration (less than 0.6 pCi/l) of Radium-226,

while the leachate from the Acid Rain experiment (0.5 N H<sub>2</sub>SO<sub>4</sub>) showed 2.39±0.25 pCi/I Radium-226 (See Table III). Based on the EP-Toxicity method, leachable Radium-226 from the encapsulated material would be very low. However, acid rain conditions (rain or moisture above 0.5 N H<sub>2</sub>SO<sub>4</sub> concentration) could cause a small amount of Radium-226 leaching into the surrounding soil.

# TABLE TIL LEACH STUDIES URANIUM TAILINGS

Analysus	SLURRY	SOLIDIFIED	SOLIDIFIED • • EP-Toxicity	SOLIDIFIED Acid Rain* Leach
Radium-226	(1.97 ± 0.002)103 pCi/gm	(5.57 ± 0.005)10 <sup>2</sup> pCi/gm	< 0.6 pCi/l	2.39 <u>+</u> 0.25 pCi/l

<sup>\*</sup>Simulation of Acid Rain when the atmosphere has significant concentration of sulfur dioxide. Samples were therefore leached in 0.3 M H2SO4.

An 85% Radon-222 reduction was observed in a sample that was allowed to reach secular equilibrium at a temperature below freezing point (0°C) for twelve (12) hours (see Table IV). Another sample was allowed to reach secular equilibrium at an elevated temperature of 40°C for twelve (12) hours. When de-emanated, Radon-222 reduction was 93.05%. The percent Radon-222 emanation reduction of the solidified material compares favorably to the data presented in Table I.

Table V illustrates the concentration of trace metals in the leachates and the unleached solidified sample. Ten elements were analyzed by the use of an Inductive Coupled Plasma Spectroscopy (ICP) instrument. A total digestion of the solidified Uranium tailings sample was analyzed and results compared to the leach

<sup>\*\*</sup>Normal leaching process with 0.5 N Acetic Acid (ASTM D19:12 Method).

extracts. The total fron concentration in the solidified sample was 14,900 ug/gm, while the leach extracts from both the EP-Toxicity method and the sulfuric acid leach showed a concentration less than 0.1 mg/l. Vanadium showed a total of 520 ug/g (solidified sample) and less than 0.1 mg/l in both leachates. Barium was the next highest with a total of 360 ug/g (solidified sample) and less than 0.1 mg/l in both leachates. Other elements determined were as follows: Arsenic, Cadmium, Chromium, Lead, Molybdenum, Selenium, and Silver (see Table IV). The above leach study indicates that the Sludgemaster process of solidification is successful in encapsulating toxic metals in the solidified Uranium tailings.

During this study, an investigation was also made on the effect of the encapsulation process on waste transformer oil obtained from a midwestern industrial company. Table VI shows the results obtained for the concentration of PCB's before and after solidification. PCB concentration ranged from 200 ppm to 215 ppm, and in the solidified oil, PCB concentration ranged from 23 to 33 ppm. The average percent leachable PCB, when extracted in 100% Hexane, was found to be 13.17%. The EP-Toxicity test indicated less than 0.02 ppm of PCB in the leachate. The preliminary results of this investigation show that by using the Sludgemaster process of encapsulation the concentration of PCB's is reduced in the leachates (See Table VI).

SOLIDIFIED SAMPLE LEACHED IN ACCORDANCE WITH ASTM METHOD D19:12 (EP-TOXICITY TEST) SHOWED LESS
THAN 0.02 PPM PCB'S IN THE LEACHATE.

## PCB ANALYSIS ON TRANSFORMER OIL SOLIDIFIED OIL EXTRACTED WITH 100% HEXANE

Sample /	SLURRY 	SOLIDIFICATION PPM	% Loschable PCB
i	200	23.28	11.6A
2	210	24.80	11.30
3	213	33.90	13.77
•	212	28.55	13.47
		Ave	rage: 13.17%

-13-

#### CONCLUSION AND SUMMARY

The results of the various aspects of this study indicate that the Sludgemaster process of encapsulation is not only capable of reducing the percent of Radon-222 emanation but also reduces the possibility of the leaching of toxic elements. Radon-222 emanation after solidification showed a 93.51% reduction from the slurry. The Gamma Spectral Analyses of short-lived Radon daughters supported the above findings.

Leach studies on solidified refinery waste and transformer oils indicate there is a significant reduction in the possibility of toxic substances leaching out of the solidified samples. Further studies are needed to confirm the results of this investigation; however, the present findings indicate that the Sludgemaster process of encapsulation could substantially reduce Radon-222 exhalation to the environment from Uranium tailings ponds and reduce toxic leachates from hazardous waste materials.

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TECHNICAL AND ADVISORY SERVICES • ENVIRONMENTAL HEALTH AND SAFETY

November 30, 1983

Mr. Larry Boyle Safety Supervisor Crosby & Overton, Inc. 1620 West 16th Street Long Beach, CA 90813

Subject: Industrial Hygiene Survey re McCall Land

Fill Activity on November 22, 1983.

Dear Mr. Boyle:

In accordance with your request, on November 22, 1983 Industrial Hygiene surveillance was provided during Crosby and Overton's (C&O's) work activity on the McCall Land Fill, Fullerton, CA. C&O was engaged in drilling holes, taking core samples, and performing in-situ treatment demonstrations.

The surveillance consisted primarily of sulfur dioxide  $(SO_2)$  and hydrocarbon (as benzene) monitoring of worker exposures, source concentrations and perimeter concentrations. An Interscan direct-reading  $SO_2$  detector  $(0-50~\rm ppm~range)$  and Dräger detector tubes were used for  $SO_2$  monitoring. An HNU photoionization detector and Gastec detector tubes were used for hydrocarbon monitoring. The Interscan unit was read at scale face value. The HNU unit was read with benzene calibrated at 49 ppm on the 0-200 scale.

Perimeter downwind readings prior to the start of work were below detectable levels for SO<sub>2</sub> and hydrocarbons (HC). Hole drilling and treatment drilling resulted in significant SO<sub>2</sub> exposures for the drill and treatment rig operators - particularly when drilling went below 10 feet. Peaks above 50 ppm (off scale) were detected with the Interscan unit. Dräger tube readings inside the metal shroud, when used, confirmed this finding. Frequently, eye irritation levels were experienced. These peaks occurred both with and without the drilling shroud. As soon as this problem was identified the operators were outfitted with supplied-air respirators instead of the single use air purifying types that were used at the outset. During these drilling and treatment activities SO<sub>2</sub> concentrations 300 feet downwind did not exceed 0.5 ppm.

10941 Bloomfield St. Suite B/C Los Alamitos, CA 90720 213/430-1031

Crosby & Overton, Inc. November 30, 1983 Page 2

Hydrocarbon (HC) peaks were concurrent with the  $SO_2$  peaks. However, source (above the hole) monitoring never exceeded a reading of 100 (approximately 100 ppm as benzene). Downwind monitoring 75 and more feet away from the drilling activities did not result in any elevated readings (<0.2 ppm as benzene).

Very strong and noxious odors of a mercaptan/thiophene type were noticable continuously throughout the day as soon as soil penetration work began.

Following treatment, gas containing  $SO_2$  could be seen (and measured) bubbling up through the treated matrix. Samples of the matrix itself were removed and placed at the air intake of the Interscan  $SO_2$  detector. Little or no elevation in reading was observed. At the top of the treated hole, however,  $SO_2$  levels above 50 ppm were measured.

#### Comments/Discussion

It is quite evident that an  $SO_2$  short-term exposure hazard exists for workers on the site when the earth is penetrated. The peak potential exists when penetration approaches or exceeds 10 feet. Air-supplied respiratory protection is mandatory.

The concept of an exhaust vented shroud with emission scrubbing is feasible. The rate of exhaust ventilation provided on November 22nd was not sufficient to overcome the peak rates of SO<sub>2</sub> gassing from the hole(s). Improvement in shroud design (flexible type instead of rigid) and design of sufficient exhaust volume and scrubbing capacity are possible. Complete shrouding (tenting) of the drilling operations is also feasible.

Mitigation of this site by scoop and shovel removal methodology would appear to present an extreme SO<sub>2</sub> hazard to operating personnel. Also, very significant levels can be expected to go beyond the perimeters of the site. The hole drilling site treatment methodology, as observed on 11/22/33, with improved point of operation shrouding and scrubbing has much more appeal from an occupational and community health standpoint.

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Crosby & Overton, Inc. November 30, 1983 Page 3

Unless an "extra measure" of enclosure and scrubbing is initiated, the bad odors will have to be tolerated as a one-time event during the site mitigation work. The odors, in themselves, are not an apparent health hazard.

For any questions, clarifications or further assistance we remain at your service.

Sincerely,

Howard B. Spielman, MA, PE, CIH, CSP Certified Industrial Hygienist

HBS/tc



### Department of Environmental Quality

522 S.W. FIFTH AVENUE, BOX 1760, PORTLAND, OREGON 97207 PHONE: (503) 229-5696

January 9, 1986

For your information, the Department of Environmental Quality (DEQ) is providing you with a copy of our new Hazardous Waste Enforcement Guidelines. These guidelines are an internal management document used by the Department to aid us in evaluating and making enforcement decisions related to violations of Oregon's Hazardous Waste laws and regulations.

These guidelines identify for you those areas we consider to have very serious environmental consequences. The Department will be striving for a consistent uniform enforcement posture, particularly in those areas relating to facility closure and post closure, financial assurance, groundwater protection, and unauthorized disposal of hazardous waste.

In addition to strengthening the DEQ's administration of the hazardous waste management requirements, these guidelines will help provide the regulated community with a uniform enforcement effort from the state and federal government. It is the desire of DEQ to provide a single state-run hazardous waste, management program in Oregon. This will reduce the confusion and inconsistency that has resulted from both DEQ and the federal Environmental Protection Agency implementing the hazardous waste program in Oregon over the past few years. These guidelines are an important element in ensuring DEQ has the authorization to implement Oregon's hazardous waste management program in lieu of the federal program.

We recognize that the regulated community is responsible for understanding what is required when handling hazardous waste and complying with all applicable laws and regulations. We also feel, however, that it is in the best interest of the environment as well as you to understand what is of high priority to us. Managing hazardous waste in a proper manner is very important, and if mismanaged can have serious environmental and public health consequences. These guidelines have been provided to help you understand what will be expected and consequently to prevent violations and achieve compliance before formal enforcement action is taken.

Sincerely,

Fred Hansen Director

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ENFORCEMENT GUIDELINES AND PROCEDURES

HAZARDOUS WASTE PROGRAM

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
NOVEMBER 1985

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#### SECTION 1

#### INTRODUCTION

#### Purpose and Scope

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The Enforcement Guidelines and Procedures (hereafter "enforcement guidelines") presents a framework for enforcement of the Oregon Department of Environmental Quality's (DEQ) Hazardous Waste Program. This document sets forth DEQ's approach to responding to documented instances of noncompliance. Requirements pertaining to hazardous waste handlers are contained in: (1) Oregon Revised Statutes (ORS) 459.410 to 459.450 and 459.460 to 459.690; (2) Oregon Administrative Rules (OAR), Chapter 340, Divisions 100-106; (3) permits (licenses) issued pursuant to applicable OAR and ORS; and, (4) orders of the Department and Commission.

The goal of enforcement is to obtain correction of environmental or public health impacts resulting from noncompliance and expeditious resolution of hazardous waste program violations.

The purpose of this document is to provide guidelines to Department staff to ensure effective state enforcement of hazardous waste requirements. The enforcement guidelines identify the state's enforcement authorities and contain procedures for determining categories of violations and associated timely and appropriate enforcement responses.

Priorities are established to ensure that those violations which cause or have the potential to cause serious environmental harm or public health hazards are addressed by the Department with higher priority than violations of an administrative nature. Timelines are also established for initial and subsequent escalated enforcement responses to provide for resolution of noncompliance in the shortest practicable time period.

When administrative civil penalties are assessed by the DEQ Director, the guidelines in this document may be consulted in conjunction with OAR 340-12-045 to ensure that: (1) penalties are assessed fairly and consistently; (2) penalties are appropriate to the gravity of the violation; and (3) economic incentives for noncompliance are reduced as much as possible.

#### <u>Use</u>

The enforcement guidelines are intended for use only by Department personnel involved with administering DEQ's Hazardous Waste Program. The guidelines are based upon existing authorities granted by and procedures and considerations contained in Oregon Revised Statutes and Oregon Administrative Rules. This document is not intended to limit in any way the state's enforcement authorities or practices. The Department may initiate any action or seek any relief, as provided for in Oregon statutes and rules, that is deemed appropriate or necessary.

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These guidelines are not intended and should not be relied upon to create rights, substantive or procedural, which are enforceable by any party contesting or appealing a Department action.

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The enforcement guidelines will be used by the Department beginning January 1, 1986. In general, enforcement actions initiated by DEQ after January 1, 1986, in response to hazardous waste violations detected after this date, are intended to be guided by this document. Except as noted below, violations which are detected prior to January 1, 1986, and for which an enforcement action is taken after January 1, 1986, may, but are not necessarily required to, be addressed by these guidelines.

The provisions of this document pertaining to escalation of enforcement responses (Part B of Section 3) apply to all enforcement actions taken after January 1, 1986, regardless of when the violation was detected.

#### SECTION 2

#### GENERAL PRINCIPLES

Enforcement of the Department's hazardous waste program will be guided by the following general principles:

- 1. The objective of enforcement is to attain and maintain compliance with hazardous waste statutes and rules administered by DEQ.
- 2. Responsibility for compliance rests with those persons conducting activities covered by these statutes and rules and with permits and orders issued pursuant thereto.
- 3. DEQ enforcement actions will be appropriate to the gravity of the violation, pursued to resolution in a timely manner, and applied consistently statewide.
- 4. Enforcement actions will be escalated to an appropriate level when violators fail to comply with established compliance schedules.
- 5. DEQ will endeavor, by conference, conciliation and persuasion, to solicit compliance prior to and following issuance of enforcement action.
- 6. All enforcement actions will clearly identify each and every documented violation, establish compliance schedules if appropriate and require the violator's certification that compliance is achieved.
- 7. Compliance schedules established will be for the shortest practicable time and may include interim mitigating measures to minimize adverse effects of noncompliance.
- 8. Resolution of violations shall be documented through an appropriate means.

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#### SECTION 3

#### VIOLATION CATEGORIES

Each documented violation of a statutory requirement, rule, or condition of an order or permit will be categorized according to the seriousness of the violation and other relevant factors identified in this section. Each instance of noncompliance is considered a separate violation and should be classified separately. Using the guidelines in Section 4, a single enforcement response, which addresses all of the violations, should be selected.

Violations will be classified into one of three categories as described more fully below:

#### Class I Violation - A violation which:

- creates a likelihood for harm or for significant environmental damage, or has caused actual harm or environmental damage;
- involves the unauthorized disposal of hazardous waste;
- results in the failure to assure that groundwater will be protected or that proper closure and post-closure activities will be undertaken; or
- involves the failure to establish and maintain financial assurance mechanisms

#### Class II Violation - A violation which:

- results in a release or creates a threat of release of hazardous waste to the environment but does not create a likelihood for harm or environmental damage; or,
- involves the failure to ensure hazardous wastes are destined for and delivered to a permitted, interim status or designated facility.

<u>Class III Violation</u> - Any other violation of hazardous waste rules, permits or orders.

Examples of Class I, II, and III violations, using this classification scheme, are included in Appendix II.

While there are some hazardous waste requirements whose violation would, in almost all situations regardless of the circumstances, clearly meet the Class I criteria, cases may arise in which a particular violation's "likelihood for harm" is superficially unclear. Therefore, potential Class I violations should be evaluated in consideration with other relevant factors in order to determine the likelihood for harm. These additional factors may include, but are not limited to, the following:

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- the type and duration of the violation;
- the degree of deviation from the requirement;
- precautions, actions or measures taken by the violator which would mitigate potential adverse impacts of the handler's operation;
- the hazard characteristics and quantity of the hazardous waste; and
- specific characteristics of the site where the violation occurred.

#### SECTION 4

#### TIMELY AND APPROPRIATE ENFORCEMENT RESPONSE

This section identifies the options for appropriate enforcement actions in response to violations. A more detailed discussion of these actions is contained in Section 5.

Timeframes for DEQ enforcement actions are also included. The timeframes described herein are considered the maximum allowable -- enforcement actions should proceed more quickly if possible. Where timeframes begin with the date of violation discovery, this shall be interpreted as the date that the Department inspector determines through review of the inspection report and/or data (e.g., laboratory reports) that a violation has occurred.

In general, initial DEQ enforcement actions for Class II and III violations will be at the lowest appropriate level and subsequently escalated if violators fail to achieve compliance or meet established compliance schedules. There are exceptions, however, as noted below.

#### A. INITIAL ENFORCEMENT RESPONSES

#### CLASS I VIOLATIONS

Appropriate Enforcement Response: The Department generally intends to assess civil penalties for Class I violations through issuance of a Civil Penalty Assessment.

DEQ will also establish compliance schedules to return violators to full compliance, through issuance of either a Notice of Intent to Assess Civil Penalty (hereinafter "Notice of Intent") or an Order. If correction of the Class I violations will require an extended period of time and substantial effort (e.g., development of Part B application, installation of surface impoundment liner, etc.), DEQ may issue an Order in lieu of the Notice of Intent.

If Department staff have reason to believe that either of these DEQ administrative actions will be ineffective in obtaining the violator's full compliance, direct court action may be recommended.

<u>Timeliness of Enforcement Response:</u> The times indicated below pertain to the state's enforcement response options. They include the writing, processing and issuance of the enforcement action.

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Enforcement Action		Time	
а.	Civil Penalty Assessment	45 days after violation discovery.	
b.	Notice of Intent	45 days after violation discovery.	
c.	DEQ order	45 days after violation discovery.	
d.	Referral to Department of Justice for court action	45 days after violation discovery.	

#### CLASS II VIOLATIONS

Appropriate Enforcement Response: In general, the initial DEQ enforcement response to Class II violations will be a Notice of Violation (NOV) issued by the Regional Manager.

Alternately, a Notice of Intent should be issued if: (1) correction of the violations will take longer than 90 days; (2) the violator has a large number of Class II violations; or (3) the Department has reason to believe the NOV will be ineffective.

In cases where correction of Class II violations will require an extended period of time and substantial effort, issuance of an Order may be recommended.

<u>Timeliness of Enforcement Response:</u> The times indicated below include the writing, processing and issuance of the respective enforcement responses.

Enforcement Action	Time	
a. Notice of Violation	30 days after violation discovery.	
b. Notice of Intent	60 days after violation discovery.	
c. DEQ order	90 days after violation discovery	

#### CLASS III VIOLATIONS

Appropriate Enforcement Response: A violator with only Class III violations will normally be issued a Notice of Violation as the initial enforcement response.

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If there are a large number of Class III violations or if the violations will require more than 90 days to correct, a Notice of Intent should be issued initially.

Issuance of an Order or Civil Penalty Assessment as an initial enforcement response generally will not occur unless there are significant aggravating circumstances.

#### Timeliness of Enforcement Response:

Enforcement Action	Time
a. Notice of Violation	30 days after violation
b. Notice of Intent	60 days after violation discovery.

#### B. ESCALATION OF ENFORCEMENT RESPONSES

While the Department expects the majority of violations to be resolved with an initial enforcement response, DEQ will closely monitor compliance schedule dates and expeditiously take subsequent actions if such dates are not met or if full compliance is not achieved.

Appropriate Enforcement Response: Subsequent enforcement actions taken in response to a violator's failure to comply with an initial enforcement action normally will be escalated as indicated below:

<u>Ir</u>	itial Enforcement Response	Subsequent Enforcement Response
a.	Notice of Violation	Notice of Intent.
b.	Notice of Intent	Assessment of Civil Penalty.
c.	Assessment of Civil Penalty	Additional Assessment of Civil Penalty or Department order.
d.	DEQ order	Assessment of Civil Penalty or referral to Department of Justice for court action.

However, these guidelines should not be interpreted to preclude DEQ from taking a subsequent enforcement action which may be more than one level higher than the intitial action. For example, if a Notice of Violation is issued as the initial response to Class II violations, and compliance is not achieved with 90 days, DEQ may assess a civil penalty without first issuing a Notice of Intent.

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<u>Timeliness of Enforcement Response:</u> Subsequent enforcement actions taken in response to a violator's failure to comply with the initial enforcement action will proceed according to the following timeframes.

Enforcement Action		Time <sup>1</sup>
a.	Notice of Intent	30 days
b.	Assessment of Civil Penalty	45 days
c.	DEQ order	60 days
d.	Referral to Department of Justice for Court Action	90 days

#### C. CHRONIC OR REPEATED VIOLATIONS

If the Department finds that a person is a chronic violator of hazardous waste program requirements, or repeatedly violates the same requirements, this is an indication that the past enforcement actions were not successful in deterring the violator. In such cases, it may be appropriate for DEQ to escalate the initial enforcement actions for the newly documented violations above the level normally indicated for an initial response.

For example, if a violator has repeated Class III violations, DEQ may issue a Notice of Intent or a Civil Penalty Assessment for the new violations, rather than begin with a Notice of Violation.

#### D. COMBINATIONS OF CLASS I, II AND III VIOLATIONS

When a violator has violations of more than one classification, it is desireable to issue one consolidated enforcement response which covers all of the violations.

For example, if a person has several Class I and Class II violations, a single Notice of Intent should be issued, citing all of the Class I and Class II violations. (The accompanying Civil Penalty Assessment, which is the appropriate enforcement response for Class I violations, would only cite and cover the Class I violations.)

Although dual enforcement actions should be minimized, they may be appropriate in some cases. For example, a person with both Class II and Class III violations could receive a penalty assessment for the Class II violations and a separate NOV or Notice of Intent for the Class III violations. This might occur when the circumstances surrounding the Class II violations justified a penalty, but the Class III violations did not.

Begins on the first day after a compliance schedule date is not met.

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#### SECTION 5

#### TYPES AND DESCRIPTIONS OF ENFORCEMENT RESPONSES

<u>Notice of Violation</u> is a written notice that identifies the violations and specifies a date when the violator must return to full compliance. Interim compliance dates may be included if appropriate.

Notices of Violation are used when there are Class II or III violations which can be corrected within 60 days of the notice. A Notice of Violation should not be considered a prerequisite to issuance of a Notice of Intent or a civil penalty if it is thought that either of those actions will eventually be needed to obtain compliance by the violator.

Notices of Violation are issued by the Regional Managers or their staff. The notice shall require a written response from the violator noting how and when the violations were corrected. The Department may conduct a followup inspection to verify compliance.

Notice of Intent to Assess Civil Penalty is a written document which warns a violator that civil penalties may be assessed for violations cited therein without further notice from the Department. The Notice of Intent cites the particular violations and describes the factual findings upon which the violations are based.

The letter accompanying the Notice of Intent shall either specify a schedule, if appropriate, for the violator to return to compliance or require the violator to submit a compliance schedule by a specified date for Department approval. A compliance schedule should contain interim requirements and dates for their achievement if final compliance will exceed 120 days. A compliance schedule should require that progress reports be submitted to the Department within 14 days following each scheduled date.

Notices of Intent are issued for all Class I violations and for Class II or Class III violations which require more than 60 days after the notice to correct. Notices of Intent are issued by the Administrator of the Regional Operations Division, based upon a referral to the Enforcement Section. The Hazardous Waste Section Manager and the appropriate Regional Manager shall be consulted for concurrence prior to issuance of Notices of Intent.

Failure to comply with the compliance schedule in a Notice of Intent should result in an escalated action such as civil penalty, Department order or referral to Department of Justice for court action.

Civil Penalty Assessment means the administrative levying of a monetary penalty by the Director of the Department. A hazardous waste management schedule of civil penalties is contained in OAR 340-12-068 and varies from not less than \$100 to not more than \$10,000 for each violation. Each day the violation continues may constitute a separate offense.

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In determining the amount of a civil penalty, the Director may consider the criteria in OAR 340-12-045. (Section 7 of these guidelines restates OAR 340-12-045 and provides guidance for determining the amount of a penalty.)

Pursuant to ORS 468.125, the Department is not required to provide advance notice prior to assessing a civil penalty for a violation of hazardous waste program requirements (ORS 459.410 to 459.450 and 459.460 to 459.690).

As indicated in Section 4 of these guidelines, civil penalties normally will be assessed against persons with Class I violations and may be assessed against persons who fail to comply with a Notice of Intent or Department order.

Assessments of civil penalty grant the violator the right to request a contested case hearing before the Environmental Quality Commission or its hearings officer. Under certain circumstances, the civil penalty may be mitigated in whole or in part by the Commission. Contested case decisions may be appealed to the Commission and are subject to judicial review.

Failure to comply following an assessment of civil penalty should result in the assessment of an additional penalty, Department order, site operation shutdown order or referral to Department of Justice for court action.

<u>Department Order</u> means an order issued by the Department pursuant to ORS 459.660. Whenever the Department believes a violation has occurred, it may investigate and issue an order requiring changes or compliance without notice or hearing. The Order takes effect 20 days after the date of its issuance, unless a hearing is requested before the 20-day period has expired.

If the Order is appealed, a contested case hearing is held by the Environmental Quality Commission or its hearing officer and is subject to judicial review. Failure to comply with the Order is enforceable through the assessment of civil penalties or criminal action.

Department orders may be used to respond to persons with Class I violations which require an extended period of time and substantial effort to correct or persons who do not adequately respond to initial enforcement actions. Compliance schedules may be included in Orders if appropriate. (See discussion of Notice of Intent in this section for guidance on compliance schedules.) In general, the Department's desire in issuing an Order is to obtain the respondent's consent to the terms of the Order. Therefore, if it appears likely that an order would be contested, use of a Notice of Intent to establish compliance requirements may be preferred.

Department orders shall be prepared by the Enforcement Section of Regional Operations based upon an enforcement referral from the Regional Manager. Department orders will require the concurrence of the Manager of the Hazardous Waste Section and the Administrator of the Hazardous and Solid Waste Division before being issued by the Director.

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Commission Order means an order issued by the Environmental Quality Commission pursuant to ORS 459.650. Upon receipt of a complaint made to it by any person, the Department shall make an investigation to determine if the operation of any generator, transporter or hazardous waste management facility is unsafe or is in violation of a statute or regulation. Following the investigation, if the Department is satisfied that sufficient grounds exist to justify a hearing, it shall give 10 days' written notice of the time and place of the hearing. Within 30 days of the hearing, the Commission shall make a specific order as it considers necessary. Any Order is subject to judicial review. Failure to follow the order, once final, may subject the violator to a Notice of Intent, assessment of a civil penalty, site operation shutdown order, injunctive relief or criminal action.

Commission orders are issued by the EQC or its hearing officer following a hearing. The results of the inspector's investigation will be reviewed by the Administrator of the Hazardous and Solid Waste Division, the Director and the Attorney General's Office before a hearing is scheduled for Commission action. The Department will not ordinarily use this authority unless initiated by a complaint, since ultimate enforcement of the Order would revert to an assessment of a civil penalty, site operation shutdown order, injunctive relief or criminal action.

Site Operation Shutdown Order means an order issued by the Department pursuant to ORS 459.680 without prior notice or hearings. The Department must establish reasonable cause that a clear and immediate danger to public health, welfare, safety or the environment exists from the continued operation of the activity or site. The Order shall be served on the site superintendent. Within 24 hours, the Department must appear in circuit court to petition for the equitable relief required to protect public health, welfare, safety or the environment.

<u>Injunctive Relief</u> means actions or proceedings pursuant to ORS 459.690 for equitable remedies to enforce compliance or restrain further violations whenever it appears to the Department that any person is engaged or about to engage in any acts or practices that cause or threaten to cause a substantial violation or threat to public health, safety, welfare or the environment. No prior administrative hearing is required.

Criminal Action means proceedings under ORS 459.992(4). Criminal actions are handled by the local District Attorney for the county in which the violations occur. Referrals to the local District Attorney by inspectors shall not occur without the approval of the Director of the Department. The Administrators of the Hazardous and Solid Waste Division and Regional Operations Division shall confer with the Director on the merits of proceeding with criminal action in lieu of the other administrative remedies described in this policy. The Attorney General's Office may also be consulted. The Department may also consider referral of potential criminal actions to EPA for investigation.

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The following types of cases or situations may warrant criminal action: (1) a hazardous waste handler violates the terms of a Notice of Intent, Commission order or Department order and does not respond to the assessment of a civil penalty; (2) a hazardous waste handler is a frequent and recalcitrant violator; (3) long-term specific conduct by a violator is to be compelled; (4) deterrence of others situated similarly to the violator is a main goal; and (5) intentional disposal of hazardous waste at an unauthorized disposal site.

Occasionally, local agencies (i.e., city police or fire, county sheriff) may be involved in investigating hazardous waste violations along with the state. Local government has the right and opportunity to seek a criminal action with or without DEQ concurrence and/or knowledge.

#### SECTION 6

#### **PRIORITIES**

All violations documented will be addressed with an appropriate enforcement response. In general, the Department's priority targets will be, first, Class I Violations, then Class II Violations, and then Class III Violations.

Within each category of violations, enforcement priorities may need to be set. In doing so, Department staff should consider the following factors:

- o The magnitude and imminence of the actual or potential public health or environmental threat.
- o The duration of the handlers noncompliance -- if two similar noncompliance scenarios exist, the one which has existed longer should generally be addressed first.
- o Length of time needed to achieve compliance -- violators requiring long-term remedies should be addressed first, except for imminent threat situations.
- o Strength of case -- when all other considerations are equal, the stronger case should receive higher priority.
- o Expression of uncooperativeness or willingness by violator to correct violations.
- o Potential for the enforcement action to set an important precedent.

#### SECTION 7

#### ASSESSMENT OF ADMINISTRATIVE CIVIL PENALTIES

As indicated in previous sections of these enforcement guidelines, assessment of civil penalties by the DEQ Director is one enforcement tool available to DEQ. A civil penalty may be an appropriate enforcement response depending upon the nature of a violation and its surrounding circumstances.

This section focuses on considerations which may be relevant when determining the proper amount of a civil penalty once a decision has been made that a civil penalty is the appropriate enforcement remedy to pursue.

#### Relationship to Statutory and Regulatory Provisions

These guidelines do not substitute for consideration of existing provisions in Oregon Revised Statutes (ORS) and Oregon Administrative Rules (OAR) pertaining to assessment of civil penalties. This document does not establish any new authorities or require any action be taken which conflicts with provisions of existing state law. The guidelines are intended solely to help staff understand the applicable ORS and OAR provisions.

ORS 459.995 establishes the liability of hazardous waste violators for civil penalties. In particular, ORS 459.995(2) states that:

"(2) In addition to any other penalty provided by law, any person who violates ORS 459.410 to 459.450 and 459.460 to 459.690, a license condition or any commission rule or order pertaining to the generation, treatment, storage, disposal or transportation by air or water of hazardous waste, as defined by ORS 459.410, shall incur a civil penalty not to exceed \$10,000 for each day of the violation."

Additionally, ORS 459.995(3) states that:

"(3) The civil penalty authorized by subsections (1) and (2) of this section shall be established, imposed, collected and appealed in the same manner as civil penalties are established, imposed and collected under ORS 448.305, 454.010 to 454.040, 454.205 to 454.255, 454.405 454.425, 454.505 to 454.535, 454.605 to 454.745 and ORS chapter 468."

Due to the references in ORS 459.995(3), Chapter 459 does not stand alone. The principal reference for consideration is ORS Chapter 468 which, in part, authorizes establishment of civil penalty schedules, and specifies considerations for imposing penalties (see ORS 468.130, 468.135, and 468.140). These statutory provisions have been codified by the Commission and comprise Division 12 of OAR Chapter 340. OAR 340-12-068 includes a hazardous waste management schedule of civil penalties. OAR 340-12-045 identifies factors which the Director may consider in establishing the amount of a civil penalty.

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#### Summary of Penalty Determination

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When a penalty is to be assessed by the Director, penalty determination can be thought of as proceeding along a component approach. First, a "gravity-based" penalty component is determined. Next, the economic benefit of noncompliance may be calculated if it is expected to be significant. Finally, other relevant factors of OAR 340-12-045 may be considered, where such information is available, to adjust the penalty.

The gravity-based component of a penalty considers "The gravity and magnitude of the violation" factor of OAR 340-12-045. This factor can be displayed as a matrix (discussed later).

Where a violator has derived significant savings by its failure to comply with hazardous waste requirements, the Director may calculate the amount of economic benefit from noncompliance gained by the violator and add this amount to the gravity-based penalty. Consideration of the economic benefit of noncompliance is provided for in OAR 340-12-045(1)(j), i.e., "any other relevant factor."

The Director may adjust the gravity-based penalty upwards or downwards to reflect consideration of other factors as provided for in OAR 340-12-045, if sufficient information is available. These factors include:

- (a) Whether the respondent has committed any prior violation, regardless of whether or not any administrative, civil, or criminal proceeding was commenced therefore;
- (b) The history of the respondent in taking all feasible steps or procedures necessary or appropriate to correct any violation;
- (c) The economic and financial conditions of the respondent;
- (d) Whether the violation was repeated or continuous;
- (e) Whether a cause of the violation was an unavoidable accident, or negligence, or an intentional act of the respondent;
- (f) The opportunity and degree of difficulty to correct the violation;
- (g) The respondent's cooperativeness and efforts to correct the violation for which the penalty is to be assessed;
- (h) The cost to the Department of investigation and correction of the cited violation prior to the time the Department receives respondent's answer to the written notice of assessment of civil penalty; or
- (i) Any other relevant factor.

A penalty may be calculated for each separate and independent violation documented by the Department. In no case can the total penalty for any single violation exceed the statutory maximum of \$10,000 per day.

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#### Determination of the Gravity-Based Penalty

In determining the gravity-based component of a civil penalty, the following aspects of a violation are considered:

- o Potential for harm; and
- o Extent of deviation from a statutory or regulatory requirement.

#### Potential for Harm

The Department's requirements for hazardous waste handlers were promulgated in order to prevent harm to human health and the environment. Thus, noncompliance could create actual harm or a potential for harm.

The potential for harm in a particular situation can be classified as major, moderate, or minor. The degree of potential harm represented by each category is defined as:

- o MAJOR Violation poses a major adverse effect on public health or the environment.
- o <u>MODERATE</u> The violation poses a moderate adverse effect on public health or the environment.
- o <u>MINOR</u> The violation poses a minor adverse effect on public health or the environment.

#### Extent of Deviation from Requirement

The "extent of deviation" from the Department's statutes or regulatory requirements (i.e., magnitude of violation) is an important factor in determining the amount of a civil penalty. Violators may be substantially in compliance with the provisions of the requirement or they may have totally disregarded the requirement (or a point in between). As with potential for harm, extent of deviation may be either major, moderate, or minor. In determining the extent of deviation, the following definitions should be used:

- o <u>MAJOR</u> the violator deviates significantly from the requirements of the regulation or statute to such an extent that almost none of the requirements are met.
- o <u>MODERATE</u> the violator deviates from the requirements of the regulation or statute, but some of the requirements are implemented as intended.
- o <u>MINOR</u> the violator deviates somewhat from the regulatory or statutory requirements but most of the requirements are met.

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#### Gravity-Based Penalty Matrix

Consideration of a violation's "gravity and magnitude" may be facilitated by referring to a matrix whose two axes are; 1) the potential for harm, and 2) the extent of deviation from a requirement. The matrix has nine cells, each containing a penalty range. The specific cell is chosen after determining which category (major, moderate or minor) is appropriate for the potential for harm factor, and which category is appropriate for the extent of deviation factor. The complete matrix is illustrated below:

#### Extent of Deviation from Requirement

Potential for Harm

32

	MAJOR	MODERATE	MINOR
MAJOR	\$10,000	\$ 7,999	\$ 5,999
	to	to	to
	8,000	6,000	4,400
MODERATE	\$ 4,399	\$ 3,199	\$1,999
	to	to	to
	3,200	2,000	1,200
MINOR	1,199	599	199
	to	to	to
	600	200	100

The highest cell (major potential for harm/major extent of deviation) is limited by the maximum statutory penalty allowance of \$10,000 per day of violation.

#### Assessing Multiple Penalties

In certain situations, a particular violator may have violated several DEQ hazardous waste rules. A separate penalty may be calculated for each violation that results from an independent act (or failure to act) by the violator and is substantially distinguishable from any other violation for which a penalty is to be assessed. A given violation is independent of, and substantially distinguishable from, any other violation when it requires an element of proof not needed by the others. In many cases, violations of different rules constitute independent and substantially distinguishable violations.

For example, failure to implement a groundwater monitoring program and failure to have a written closure plan are violations which result from different sets of circumstances and which pose separate risks. In the case of a firm which has violated both of these rules, a separate count would be charged for each violation. For penalty purposes, each of the violations would be evaluated separately and the amounts totalled.

It is also possible that different violations of the same rule could constitute independent and substantially distinguishable violations. For example, there are two separate violations in the case of a firm which has open containers of hazardous waste in its storage area and which also ruptured different hazardous waste containers while moving them on site.

The violations result from two sets of circumstances (improper storage and improper handling) and pose separate and distinct risks. In this situation, two violations with two separate penalties would be appropriate. For penalty purposes, each of the violations would be assessed separately and the amounts totalled.

Multiple penalties also may be assessed where a person has violated the same requirement in substantially different locations. An example of this type of violation is failure to clean up hazardous waste discharged during transportation. A transporter who did not clean up waste discharged in two separate locations during the same trip should be charged with two violations. In these situations, the separate locations present separate and distinct risks to public health and the environment. Thus, separate penalty assessments are justified.

In general, multiple penalties would not be appropriate where the violations are not independent or substantially distinguishable. Where a violation derives from or merely restates another violation, a separate penalty is not warranted. For example, if an owner/operator of a storage facility failed to specify in the waste analysis plan the parameters for which each hazardous waste will be analyzed and failed to specify the frequency with which the initial analysis of the waste will be repeated, the owner/operator has violated the requirement that they develop an adequate waste analysis plan. The violations result from the same factual event (failure to develop an adequate plan), and pose one risk (storing waste improperly due to inadequate analysis). In this situation, both requirements violated would be cited in the complaint, but one penalty, rather than two, would be assessed. The fact that two requirements were violated may be taken into account in choosing higher "potential for harm" and "extent of deviation" categories on the penalty matrix.

#### Assessing Multi-Day Violations

The Director has authority to assess civil penalties of up to \$10,000 per violation per day, with the potential of assessing each day of noncompliance as a separate violation. Multi-day penalties would generally be calculated in the case of continuing flagrant violations. However, per day assessment may be appropriate in other cases.

In the case of continuing violations, the Director has the authority to calculate penalties based on the number of days of documented violation since the effective date of the requirement and up to the date of coming into compliance. The gravity-based penalty derived from the penalty matrix may be multiplied by the number of days of documented violation, when a decision has been made to assess for multi-day violations.

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#### Economic Benefit from Noncompliance

The Director may consider the economic benefit of noncompliance to a violator when assessing penalties. An "economic benefit component" may be calculated and added to the gravity-based component of a penalty when a violator acquires a significant economic benefit from violating state hazardous waste program requirements. (The total penalty cannot exceed \$10,000 per violation per day.)

The following regulatory areas are candidates for an economic benefit analysis:

- o Groundwater monitoring
- o Financial requirements
- o Closure/post-closure
- o Waste determination
- o Waste analysis
- o Clean-up of discharge
- o Part B application submittal
- o Disposal at unauthorized location

Two types of economic benefits from noncompliance may occur:

- o Benefit from delayed costs; and
- o Benefit from avoided costs.

Delayed costs are expenditures which have been deferred by the violator's faiture to comply with the requirements. The violator eventually will have to spend the money in order to achieve compliance. Delayed costs are the equivalent of capital costs. Examples of violations which result in savings from delayed costs are:

- o Failure to install a groundwater monitoring program;
- o Failure to submit a Part B permit application; and
- o Failure to develop a waste analysis plan.

Avoided costs are expenditures which are nullified by the violator's failure to comply. These costs will never be incurred. Avoided costs are the equivalent of operating and maintenance costs. Examples of violations which result in savings from avoided costs are:

- o Failure to perform annual and semi-annual groundwater monitoring sampling and analysis;
- o Failure to follow the approved closure plan in removing waste from a facility, where removal is not now possible; and
- o Failure to perform waste analysis before adding waste to tanks, waste piles, incinerators, etc.

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Because the savings that are derived from delayed costs differ from those derived from avoided costs, the economic benefit from delayed and avoided costs are calculated in a different manner. Guidance on calculating delayed and avoided costs is presented in Appendix I.

#### Adjustment Factors

As mentioned earlier, the gravity and magnitude of the violation is considered in determining the gravity-based component of a penalty. The reasons the violation was committed, the intent of the violator, and other potentially relevant factors are not considered in choosing the appropriate penalty from the matrix. However, OAR 340-12-045(1) identifies relevant factors which the Director may consider in establishing the amount of a civil penalty.

The adjustment factors can increase, decrease or have no effect on the penalty amount to be assessed to the violator. However, no upward adjustment can result in a penalty greater than the statutory maximum of \$10,000 per day of violation. Adjustment of a penalty may take place after determining the gravity-based component of the penalty but prior to issuing the penalty assessment, if the necessary information is available to the Director.

In general, these adjustment factors are applied to the gravity-based penalty component derived from the matrix, and not to the economic benefit component (if calculated).

Application of the adjustment factors is cumulative, i.e., more than one factor may apply in a case.

#### (1) Cooperativeness and efforts to correct the violation.

Cooperativeness can be demonstrated by a violator promptly reporting its noncompliance. Assuming such self-reporting is not required by law, regulation, or permit, this behavior may result in adjustment of the penalty. Prompt correction of environmental problems also can indicate a violator's cooperativeness. Lack of cooperativeness, on the other hand, can result in an upward adjustment of the penalty. No downward adjustment would be made if the efforts to comply primarily consist of coming into compliance without demonstrated promptness.

#### (2) Degree of willfulness, negligence, and/or nonavoidability

There may be instances of culpability for "knowing" violations which do not meet the criteria for criminal action. In cases where administrative civil penalties are sought for actions of this type, the penalty may be adjusted upward for willfulness and/or negligence. Conversely, there may be instances where penalty adjustment downward may be justified based on the lack of willfulness or negligence, or the presence of unavoidable circumstances.

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In assessing the degree of willfulness and/or negligence, the following factors may be considered, as well as any others deemed appropriate:

- o How much control the violator had over the events constituting the violation;
- o The foreseeability of the events constituting the violation;
- o Whether the violator took reasonable precautions against the events constituting the violation;
- o Whether the violator knew or should have known of the hazards associated with the conduct;
- o Whether the violator knew of the legal requirement which was violated.

The amount of control which the violator had over how quickly the violation was remedied also is relevant in certain circumstances. Specifically, if correction of the environmental problem was delayed by factors which the violator can clearly show were not reasonably forseeable and out of their control, the penalty may be reduced.

#### (3) Past Compliance History

Where a party previously has violated hazardous waste requirements at the same or a different site, this is usually evidence that the party was not deterred by the previous enforcement response. Unless the previous violation was caused by factors entirely out of the control of the violator, this is an indication that the penalty should be adjusted upwards. If a violator otherwise has a record of substantial compliance, the penalty may be adjusted downward.

Some of the factors to be considered are the following:

- o How similar the previous violation was;
- o How recent the previous violation was;
- o The number of previous violations;
- o The violator's response to previous violation(s) in regard to correction of problem.

A violation generally should be considered "similar" if the Department's previous enforcement response should have alerted the party to a particular type of compliance problem.

#### (4) Economic and financial conditions of the violator.

The Director generally does not intend to assess penalties that are clearly beyond the ability of the violator to pay. Therefore, the Director may consider the economic and financial conditions of a violator.

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When it is determined that a violator cannot afford the penalty prescribed by these guidelines, or that payment of all or a portion of the penalty will preclude the violator from achieving compliance or from carrying out remedial measures which DEQ deems to be more important than the deterrence effect of the penalty (e.g., payment of penalty would preclude proper closure/post-closure), the following options may be considered:

- o Consider a delayed payment schedule. Such a schedule might even be contingent upon an increase in sales or some other indicator of improved business.
- o Consider an installment payment plan with interest.
- o Consider straight penalty reductions as a last recourse.

The amount of any downward adjustment of the penalty is dependent on the individual financial facts of the case.

#### (5) Other relevant factors

These guidelines allow an adjustment for other relevant factors which may arise on a case-by-case basis. The Director may make adjustments to the gravity-based penalty for such reasons.

#### APPENDIX I

#### CALCULATING ECONOMIC BENEFIT FROM NONCOMPLIANCE

The following formula is provided to help calculate the economic benefit component:

Economic

. 5

Benefit = Avoided Costs x (1-T) + (Delayed Costs x Interest Rate)

In the above formula, T represents the firm's marginal state tax rate. Interest is calculated by using the interest rate charged by the State Department of Revenue for delinquent accounts.

The economic benefit formula provides a reasonable estimate of the economic benefit of noncompliance. If a violator believes that the economic benefit derived from noncompliance differs from the estimated amount, it may present information documenting its actual savings to the Director at the settlement stage or to the Environmental Quality Commission at the hearing stage.

For avoided costs, the economic benefit equals the cost of complying with the requirement, adjusted to reflect income tax effects on the violator.

The economic benefit for delayed costs consists of the amount of interest on the unspent money that reasonably could have been earned by the violator during noncompliance.

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#### APPENDIX II

#### EXAMPLES OF CLASSIFICATION OF HAZARDOUS WASTE VIOLATIONS

The classifications listed below are examples of the types of violations which may be classified as either Class I, II or III. This list is illustrative, not exhaustive.

<u>Example</u>	Violation <u>Class</u>
Disposing of hazardous waste at a location other than at a permitted hazardous waste management facility.	I
Failure to report a discharge of hazardous waste and take immediate action to protect human health and the environment.	I
Construction and operation of a new treatment, storage or disposal facility without a permit.	I
Installation of grossly inadequate groundwater monitoring wells such that groundwater samples are not representative of background quality in the uppermost aquifer near the facility.	I
Failure to install any groundwater monitoring wells.	I
Installation of grossly inadequate groundwater monitoring wells such that they do not immediately detect any statistically significant amounts of hazardous waste or hazardous waste constituents that migrate from the waste management area to the uppermost aquifer.	I
Failure to develop and follow a groundwater sampling and analysis plan.	I
Failure to develop a complete and written closure plan.	I
Failure of a closure plan to describe the steps needed to decontaminate facility equipment during closure.	I
Failure of a tank closure plan to provide for the removal of all hazardous waste and hazardous waste residues from tanks, discharge control equipment and discharge confinement structures.	I
Failure of a disposal facility owner/operator to have a written post-closure plan.	I

Example	Violation Class
Failure of a post-closure plan to identify planned groundwater monitoring activities or activities to ensure the integrity of the cap and final cover, during the post-closure period.	I
Failure to prepare a written estimate of the cost of closing a facility in accordance with the facility's closure plan.	I
Failure to establish and maintain a financial assurance mechanism for closure of the facility.	I
Failure of a disposal facility owner/operator to prepare a written estimate of the cost of post-closure monitoring and maintenance of the facility in accordance with the facility's post-closure plan.	I
Failure to establish and maintain a financial assurance mechanism for post-closure care of the facility.	I
Note: The following examples of Class II violations are not Class II in all cases. Depending on individual circumstant violations could be classified as Class I if they create a harm or otherwise meet the Class I criteria identified in S	es, these likelihood for
Failure to determine if a solid waste is a hazardous waste.	II
Failure to use a manifest for off-site shipments of hazardous waste.	II
Failure to designate on the manifest an authorized storage, treatment, disposal or reclamation facility.	II
Exceeding the designated time limit for on-site accumulation of hazardous wastes without receiving a permit, qualifying for interim status, or receiving an emergency extension.	II
Failure to mark each container with the words "Hazardous Waste" or with the accumulation date.	II
Failure to comply with the preparedness and prevention requirements of Subpart C of 40 CFR Part 265.	II
Storage of wastes in containers that are not in good condition or have begun to leak.	II
Failure to submit a manifest exception report.	II T.T

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<u>Example</u>	Violation Class
Failure to develop and follow a written inspection schedule.	II
Failure to remedy equipment deterioration or malfunction revealed by an inspection.	II
Failure to retain a copy of the manifest.	II
Failure to take precautions to prevent accidental ignition or reaction of ignitable or reactive hazardous waste.	II
Failure of owner/operator to submit a timely and complete Part B permit application.	III
Failure to completely fill out a manifest.	III
Failure to submit a quarterly report of all off-site shipments of hazardous waste.	III
Failure to maintain personnel training documents and records.	III
Failure to maintain a copy of the closure plan at the facility.	III
Failure to provide required notice to DEQ of foreign shipments of waste.	III

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Example	Violation Class
Failure to develop and follow a written inspection schedule.	II
Failure to remedy equipment deterioration or malfunction revealed by an inspection.	II
Failure to retain a copy of the manifest.	II
Failure to take precautions to prevent accidental ignition or reaction of ignitable or reactive hazardous waste.	II
Failure of owner/operator to submit a timely and complete Part B permit application.	III
Failure to completely fill out a manifest.	III
Failure to submit a quarterly report of all off-site shipments of hazardous waste.	III
Failure to maintain personnel training documents and records.	III
Failure to maintain a copy of the closure plan at the facility.	III
Failure to provide required notice to DEQ of foreign shipments of waste.	III

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LOS ANGELES



## TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

January 27, 1986

William J. Baldwin Koppers Company, Inc. 436 Seventh Avenue Pittsburgh, PA 15219

Dear Bill,

Enclosed is copy of the ATW Calweld data I promised on January 23, 1986 during our meeting at your Pittsburgh, PA offices. Calweld designed, developed and operates the equipment. ATW developed the waste treatment technology. Cary Jackson is the chemist who determines what is needed to treat whatever the problem, consistent with client desires. The proper person to contact is Franch Manchak. I have spoken with him. He has agreed to speak with you about our mutual problem.

Regarding the water treatment biodegradation process, the three basic chemicals are amonium nitrate, potassium sulfate and sodium phosphate. These fertilizer materials provide the chemical nutriants enabling bacteria to grow. Bacteria are added. The whole mixture is arable. Water is pumped from below ground to a surge tank to a 10' x 10' x 30' tank where the mixture exists. Discharge is either returned to the ground or to sewer as permitted.

Today I received the enclosed DEQ Hazardous Waste Enforcement Guidelines dated January 9, 1986. A copy is enclosed for your information. The thought I intend to convey here is related to our meeting discussion about the unknown amount of money (shown as a ?) on the "cost to date" paper presented. This is an unknown that I had no idea was in existance at the time of our meeting.

Hope this helps. It was a pleasure to see you again, to meet Dave and to provide a project status update.

61

Enclosure a/s

cc: Robert Abendroth
Jim Garrity
Dave Kerschner
From Marion
Templeton Smith

John P. Denham Environmental Manager





## TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

February 19, 1986

Koppers Company, Inc. Attn: Donald F. Marion Forest Products Group Koppers Building, Room 750 Pittsburgh, PA 15219

#### Dear Don:

This refers to our mutual problem of pentachlorophenol contamination at 12005 North Burgard Road in Portland Oregon.

A

During our January 23, 1986 meeting at your offices in Pittsburgh, you mentioned that Koppers would agree to paying half the clean-up costs incurred/committed to date and that further coordination between Koppers and Time would be appropriate for future committments. Time concurs with this approach.

In this light, the below accounting to date will be followed by an invoice two weeks from today unless we hear some objections from you before then.

#### **EXPENDITURES**

4/26/85	Chem-Security Systems (Laboratory Analysis of soil sample)	150.00
7/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	9,000.00
7/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	27,270.88
8/8/85	Environmental Emergency Services (Obtain and analyze 3 composite samples)	500.00
12/5/85	Environmental Emergency Services (Primary sampling and analysis plus report)	18,741.55 \$55,662.43

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#### COMMITTMENTS

DEQ per OAR 240-102-065

3,500.00

\* Riedel Environmental Services (Amendment 2)

25,000.00 + \$84,162.43

50% = \$42,081.21

\* Name change from Environmental Emergency Services

Should you have any questions regarding the above, please give me a call.

Sincerely,

Robert D. Abendroth Operations Manager

RDA/ch

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SEATTLE TACOMA PORTLAND STOCKTON RENO RICHMOND SAN PEDRO LOS ANGELES



## TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

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50% = \$42.081.21

Name change from Environmental Emergency Services

Should you have any questions regarding the above, please give me a call.

Sincerely,

Robert D. Abendroth Operations Manager

RDA/ch

June 4, 1986

John P. Denham Time Oil Co. 2737 W. Commodore Way Seattle, WA 98199

Dear John:

I am taking this opportunity to write you to inform you that Northwest Vacuum Truck Service, Inc. has sold substantially all its assets to Norvac Services, Inc. This action will make our company stronger and more capable than ever to serve your cleaning service needs. The same employees are here with the new company as were serving you under the previous company.

I will look forward to seeing you in the near future and take pleasure in announcing that we have expanded our services throughout the State of Washington, as well as our continued service areas of Oregon and Alaska.

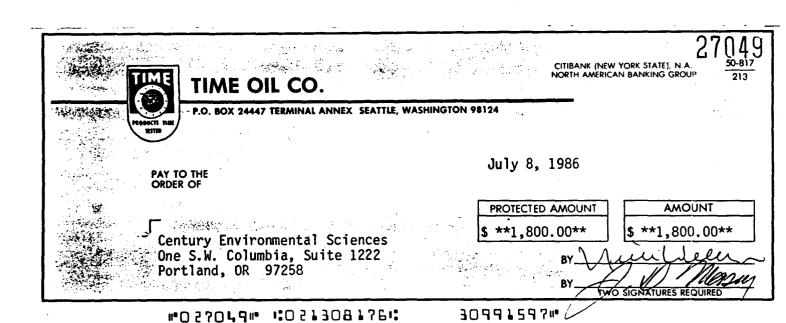
Sincerely,

John Somes

Operations Manager

John Somes

JS/jb



TIME OIL CO.

REFERENCE NO.

AMOUNT
INVOICE REFERENCE NO.

AMOUNT

CHECK DATE 7/8/86 DISCOUNT
CHECK NO. 27049 TOTAL \$1,800.00

WHEN DETACHED AND PAID, THIS CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE ITEMIZED ACCOUNT



CENTURY ENVIRONMENTAL SCIENCES

#### INVOICE FOR PROFESSIONAL SERVICES

Time Oil Co. P.O. Box 24447 2737 W. Commodore Way Seattle, WA 98124-0447

ATTN: John Denham

DESCRIPTION:

6002400102 Project No.

SAMPLE AND ANALYSIS OF EIGHT WELLS FOR PCP

P.O. # 63520

INVOICE BILLING AMOUNTS:

WORK COMPLETED FOR MAY 1986

Professional Services

\$ 1800.00

TOTAL AMOUNT DUE THIS INVOICE

\$1800:00

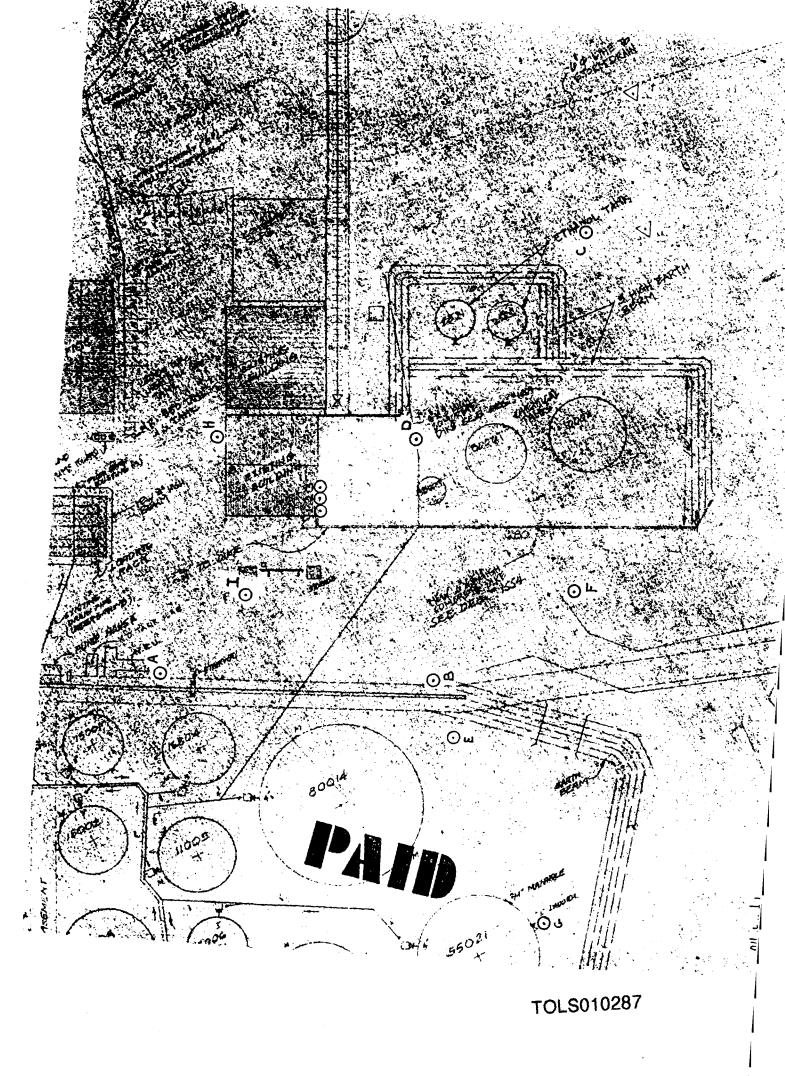


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POST OFFICE BOX 1174 • BEND, OREGON 97701 • TELEPHONE (503) 388-3500

Original for your records. Please return duplicate with remittance.

	<b>1</b>	T	ME OIL CO.		PURC	HASE OF	RDER	
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## TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

August 8, 1986

Koppers Company, Inc. Attn: Donald F. Marion Koppers Building Room 750 Pittsburgh, PA 15219

Dear Don:

Per our telecon today, copy of amendment 2 to agreement with Riedel is attached.

Since EPA advised, in December 1985, that we could no longer remove contaminated dirt from the premises, we set aside the soil investigation and concentrated on learning if there was any ground water contamination and, if so, plume extent. We installed wells, developed them, had them sampled and analyzed. Results are favorable in that only .0022 ppm was found in one spot by corner of building. Map showing well locations is attached. We also determined water flow direction and checked water elevations several times.

Now we are attempting to somehow effect clean up of soil on site. Several areas are being investigated but we do not yet, in my opinion, have any really good solution. About the middle of next month, we should be in a more knowledgeable position regarding remedial actions. Still have more sampling to do under building if possible, more water measurements to be taken and more data to develop regarding available clean up processes. Will try to gather up everything by October 1 and send it along to you for your use.

Sincerely.

John P. Denham

Environmental Manager

Enclosures a/s

JPD/ch





## TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

JAM 2 3 777

January 14, 1987

Koppers Company Inc. Attn: J. Sebbens Koppers Building Pittsburg, PA 15219

Dear Mr. Sebbens:

Enclosed is copy of the latest (October 1, 1986) update regarding Time/Koppers voluntary efforts to clean up the pentachlorophenol contamination at our Northwest Terminal in Portland, Oregon. The purpose of this paper, in addition to serving as an update for Koppers, is to have data documented by a third party which is suitable to gain approval from necessary regulatory agencies for acceptable remedial actions as next step accomplishment.

Also enclosed is copy of December 19, 1986 proposal and cost estimate by SRH for performance of bench scale evaluations of recommended "soil washing" technique. Request your comments on this matter as soon as possible.

Sincerely,

John P. Denham

Environmental Manager

Enclosures a/s

JPD/ch

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES



## TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

Jim 2 3 127

January 14, 1987

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Sincerely,

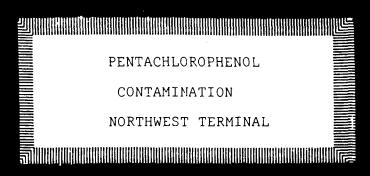
John P. Denham

Environmental Manager

Enclosures a/s

JPD/ch

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# PENTACHLOROPHENOL CONTAMINATION

AT

TIME OIL COMPANY

NORTHWEST TERMINAL

12005 NORTH BURGARD ROAD

PORTLAND, OREGON

OCTOBER 1, 1986

#### PREPARED FOR:

TIME OIL COMPANY 2737 WEST COMMODORE WAY SEATTLE, WASHINGTON

#### PREPARED BY:

SRH ASSOCIATES, INC.
123 N.E. THIRD AVENUE, SUITE 230
PORTLAND, OREGON 97232
(503) 232-0824

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#### EXECUTIVE SUMMARY

On March 1, 1967, Time Oil Co. and Koppers Company entered into an agreement wherein Time would provide certain labor and services connected, with the receipt, storage, handling and blending of specified woodtreating products, including pentachlorophenol. All products were owned by Koppers. The site selected for this activity included a warehouse and tank farm on a small (70' x 70') portion of Time's 45 acre Northwest Terminal located at 12005 North Burgard Road in Portland, OR.

The operation started up and continued routinely until January 28, 1981. Time then advised Koppers of its election to terminate the project effective March 31, 1982, the scheduled agreement expiration date. Various in-house inspections had indicated the possibility of soil contamination. Subsequent bioassay tests confirmed the existence of pentachlorophenol in the soil adjacent to the warehouse. Both companies concurred to close the site. Operations ceased. Orderly phase out actions were established and begun.

It is noteworthy that this entire closure effort was jointly planned and undertaken by the two companies to voluntarily correst what both felt may become a future problem.

By February 1985, on hand product inventory had been blended off and shipped out. All tanks and piping had been cleaned, with cleaning wastes being shipped to Arlington. Piping and tanks had been disassembled, removed and scrapped. In short, the site was cleared to ground level.

Soil clean-up began. Following coordination with the DEQ, the Arlington landfill and local contractors, some 242 tons of soil were shipped to Arlington. A sampling matrix was prepared and more than 150 soil samples were collected and analyzed for Concentration isopleths were generated, which depicted remaining contamination locations and degrees of contamination, the highest of which was 116,000 ppm. Isopleths showed site size had now expanded to about 70' x 140' in area. concrete wall along the western edge of the site was removed, decontaminated and disposed of to facilitate removal of this newly discovered increased area of soil contamination. To aid in reducing the physical size of this newly defined area, the extremities of site soil were centralized to the one spot having the highest known contaminant concentration. relocation actions were based on previously plotted contour determinations. They were successful in that the area was reduced to about 60' x 60'.

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At the end of 1985, the EPA advised Time that soil contaminated with leaked PCP had been reclassified as hazardous waste (number F027) and that there were currently no hazardous waste facilities in the U.S. that would accept this waste.

Pending resolution of EPA/DEQ acceptable disposal methods for PCP contaminated soil, efforts were directed toward the determination of possible groundwater contamination. Fourteen wells were installed and developed during 1986. Two were subscitiently closed due to inefficient operation. Remaining wells have been repeatedly sampled and those samples analyzed for PCP. Concentrations have not exceeded .044 ppm at the highest reading. While well water analysis is scheduled to contable quarterly until the project is completed, to ensure no groundwater migration goes undetected, there appears to be no real groundwater problem.

Since there was no regulatory relief in sight, which would permit off-site disposal of PCP contaminated soil. Time initiated an assessment of on-site remedial alternatives. Recommended actions are:

- a. Select the "Surface Mounted Soil Washing" technique as the most logical remedial approach.
- b. Perform bench scale and pilot level evaluations.
- c. Determine necessary destruction steps of recovered extracts.
- d. Ascertain technical permitting and economic feasibility of technique for final disposal action.
- e. Compare results with repeat step by step examination of next most logical remedial approaches which are: "Surface Mounted Thermal Extraction" and "In-Situ Thermal Extraction".

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#### SECTION I

#### HISTORY

Section I provides a sequential summary of those activities relating to pentachlorophenol (PCP) operations within the Time Oil Company Northwest Terminal located at 12005 North Burgard Road in Portland, Oregon. The information was gathered from Time Oil files at the firm's Seattle headquarters. Data was extracted from reports, memos and other correspondence from Time employees, the Oregon Department of Environmental Quality (DEQ), the US Environmental Protection Agency (EPA) and private consultants.

#### BACKGROUND

#### Agreement with Koppers Company, Inc. (1967-1982)

On March 1, 1967, Time Oil Company reached an agreement with the Koppers Company, whereby Time would provide the storage, handling and distribution of Koppers owned specialty woodtreating chemicals, including PCP. The operating area included a warehouse building and an adjacent tank farm area (about 70' x 70') with an earthern surface. This small site was to become known collectively as the woodtreating chemicals area. Early in 1981, Time notified Koppers of their intent to terminate the agreement on March 31, 1982. Time and Koppers jointly agreed to immediately cease all PCP operations at the site, to remove all products, to clean all tanks and pipelines, to remove and dispose of all tanks and pipelines, to effect clean up of whatever contamination existed and to do it all within existing regulatory guidelines.

#### Various Site Inspections (1971-1984)

A summary of in-house site inspections, over the ten year period (1971-1981), identified the following problems related to the PCP operation.

o No spill control system in warehouse. Spilled liquid was able to run unrestricted through the warehouse area and drain out through doors. Sloping of the warehouse floor and installation of drains was recommended.



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- o Floor of warehouse work area caked with product. Steam cleaning recommended.
- o No warning signs were posted which call attention to hazards in the area where PCP was stored and mixed.
- o Graind near end of pipelines saturated with product to a depth of 12 inches.

During February 1983, Time contracted with the AM-Test Corporation to conduct a fish bioassay test on the site soil. Analysis resulted in a finding of the soil (only) being toxic at the 100 and 1000 ppm levels.

On a subject matter completely unrelated to the pentachlorophenol operation and Time/Koppers planned actions, the DEQ conducted an inspection of the entire Northwest Terminal facility on October 25, 1984. On that date, the DEQ advised their intent to collect soil samples throughout the facility. It is because of this latter DEQ advisory that the following soil test results are included since two samples were taken from the woodtreating chemicals area.

On December 12, 1984, DEQ personnel collected twelve soil samples from the entire facility. Splits of each sample were provided to DEQ analytical results were received by Time on January 24, The DEQ samples were analyzed for EPA Priority Pollutants 1985. and for other substances identifiable through GC/MS scan, with a specific interest in lead content. No samples were found to have lead concentrations above the detection limit. The samples were also analyzed for fourteen pesticides, but no concentrations above the detection limit were found. Non-priority GC/MS scans indicated the presence of low concentrations of petroleum hydrocarbons in three of the twelve samples. In the analysis for EPA Priority Pollutants, ten of twelve samples were found to contain either no concentrations of any organics above the detection limit, or only trace amounts of polynuclear aromatics. One sample, taken from the woodtreating chemicals tank farm, contained 515 ppm of PCP and 12 ppm of tetrachlorophenol (TCP). The second sample from this area contained 1820 ppm of PCP and 71 ppm of TCP.

Sample splits, which had been provided to Time, were then submitted to Coffey Laboratories for analysis in order to confirm DEQ findings. Results of these analyses were received on March 15, 1986 and showed no PCP concentrations higher than 275 ppm. No pentachlorophenol was detected in any sample outside of the woodtreating chemicals area.

#### INITIAL CLEAN UP EFFORTS

#### Proposal for Removal of Contaminated Soil (1983)

In October of 1983, pending completion of site tank and pipeline

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physical removal, plans were made to excavate and dispose of soil to a depth below that where PCP contamination was found to exist. This was to be a three phase effort, fully coordinated with the DEQ and the disposal facility. Phase I consisted of initial soil removal and its transport to an authorized disposal facility. Phase II involved a thorough investigation to determine the extent of PCP contamination and its degree of concentration. Phase III was to remove and dispose of any remaining soil which was detected, by laboratory analysis, to be contaminated above acceptable limits.

On November 1, 1983, a delay in Phase I of the planned removal occurred because ownership of the hazardous waste facility at Arlington changed and some period of time was needed for the new management to reach full operational status. Further, an agreement from the new owners (Chemical Waste Management) to accept the soil at Arlington prior to any excavation was absolutely essential to ensure that Time did not become classified as a hazardous waste storage facility.

#### Removal and Disposal of Contaminated Soil (February - June, 1985)

On February 4, 1985, Time reiterated to the DEQ, its intent to excavate PCP-contaminated soil and dispose of it at an approved disposal facility. On February 19, Time executed a contract with Northwest Vacuum Truck Service, Inc. for removal and transport of the contaminated soil. On May 14, the DEQ granted approval for disposal of the PCP-contaminated soil at the Arlington landfill. On June 24, an agreement covering disposal was reached with Chem-Security Systems, Inc., operator of the Arlington facility.

Between June 25 and June 28, 1985, 288 cubic yards (242.76 tons) of soil were removed and shipped to Arlington. The soil was excavated to a depth of 2 to 4 feet below grade in the northwest corner of the woodtreating chemicals tank farm.

#### Soil Sampling (June - July, 1985)

On June 28, 1985, following completion of contaminated soil excavation, Time retained Riedel Environmental Services to perform sampling and analysis of the remaining soil. Samples of surface soils were initially collected from 22 locations around the perimeter of the woodtreating chemicals tank farm area. Three composite samples were formed and analyzed, showing PCP concentrations of up to 860 ppm. Samples of the soil from 81 individual sample sites surrounding the woodtreating tank farm area were then collected and analyzed for PCP. The results indicated that the contamination was localized to the west and south of the warehouse with little or no contamination occurring to the east of the site.

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Soil was then collected from fourteen locations at depths of 0, 2, 4, 7 and 12 feet below the surface on a triangular grid across the tank farm area. Samples were taken by the split spoon technique using a hollow stem auger drill rig, and analyses were performed in accordance with EPA procedure #8040 (SW-846). Contaminant contagr maps were developed from the data which showed a maximum PCP concentration of 26,500 ppm at the surface in the area where the loading of trucks had occurred. This finding of soil contamination caused an increase of the site size to about 70' x 140'. A second focus of contamination was at the southwest corner of the warehouse. The vertical column of contamination at the second location extended to the lowest sampling interval (12-14 feet below the surface), which was noted as being in the saturated zone at the time of sampling. The highest concentration at this depth was 2,030 ppm.

The two focal points of contamination are indicated on the surface contour isopleth map generated by Riedel and presented as Figure I-l of this report. Figure I-2 indicates the 12 foot contaminant isopleth. (Note: the southwest corner of the warehouse is indicated by the reference mark at coordinates (76,166)).

#### 600 ppm Chlorophenol Toxicity Level Interpretation (June, 1985)

On June 28, 1985, Time received a letter from the DEQ laboratory, concerning previous interpretations by the agency, that 600 ppm of total chlorophenols in soil represented the hazardous waste threshold. This conclusion was based on extraction and bio-toxicity tests performed by DEQ. The letter stated, however, that this was only used as guidance and did not necessarily reflect specific clean up requirements.

#### Removal of Concrete Wall (November, 1985)

Time retained Riedel Environmental Services in November, 1985 to remove and decontaminate a concrete wall which stood along the west perimeter of the woodtreating chemicals tank farm area. The intent of the removal of the wall was to allow for easy sample analysis, contaminant containment and future removal of the contaminated soil adjacent to the wall. This project included wall steam cleaning, subsequent testing of the wall for residual PCP and wall demolition following certification of decontamination to background levels of PCP. The wall was broken into pieces by Riedel and disposed of by Time.

# Classification of Contaminated Soil as Hazardous Waste (December, 1985)

On December 10, 1985, the EPA Region X office advised Time that soil contaminated with leaked PCP had been reclassified (from U242)



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to a hazardous waste bearing number F027. Referring to a moratorium on landfilling of such wastes, the EPA letter stated that at that time there were "no commercial hazardous waste facilities in the United States that would accept waste designated as F027." EPA also suggested that Time consult with the DEQ before continuing with clean-up operations at the site.

#### Wells 1, 2, 3 and 4 Installation (November, 1985)

Pending resolution of acceptable disposal techniques for contaminated soil containing PCP. Time concentrated on determination of possible groundwater contamination.

In November, 1985, Time again retained Riedel Environmental Services to install four groundwater monitoring wells near the southwest corner of the warehouse building. Wells 1, 2 and 3 were placed in 16-inch (O.D.) 45° slant borings which penetrated soil beneath the building to a vertical depth of 14 feet. Well 4 was installed in a 16-inch (O.D.) vertical hole drilled to a depth of 50 feet. Samples for PCP analysis were taken to advance and further earlier analyses, particularly to determine if contamination existed beneath the woodtreating chemicals warehouse.

Samples from the slant borings indicated PCP concentrations as high as 116,000 ppm at 2.5 to 4 feet below the surface, with surface concentrations ranging from 65.3 to 1,690 ppm. The concentrations generally decreased with depth. The vertical boring (Well #4) showed concentrations descreasing with depth from 574 ppm at 18.5 to 20 feet below the soil surface to a low of 1.59 ppm at 43.5 to 45 feet below the surface. The conclusion of this report was that contamination exists below the southwest corner of the woodtreating warehouse floor, although the horizontal limits of contamination were not definable with the existing data.

Geologic logging of the soil at Well #4 indicated a minor layer of low permeability about 18 to 35 feet below the surface. The well was completed by installing 4-inch PVC well casing and screen to a depth of 40 feet in the 16-inch auger hole and sand packing the well annulus to within 6 feet of the surface. A well construction diagram is shown in Figure I-3. The geologic log of this boring is shown in Figure I-4. A well construction diagram of the slant borings is shown in Figure I-5.

#### Installation of Well Points (February - May, 1986)

In February, 1986, in order to identify groundwater flow direction and gradient beneath the Northwest Terminal facility. Time installed well points at three locations surrounding the woodtreating chemicals warehouse and tank farm area. Two of the well: (A and B) were installed to a depth of 20 feet. Two wells were installed at a depth of 8 feet at location C (see Figure I-6).



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Water level measurements were taken on nine occasions between February 28 and March 11 in Wells A. B.  $C_1$ ,  $C_2$  and 4. The data collected indicated an unexpectedly lower water level in well 4 as compared with the other well locations.

To further investigate this unusual circumstance, three additional well points, four observation pits and a river level reference point were installed by Time in late March, 1986. Wells E and F were driven to depths of 20 and 19 feet, respectively, while Well G was driven to a depth of 13 feet where advancement of the point was halted by cobbles. Well  $C_2$  was removed, and Well  $C_1$  was henceforth known simply as Well C. Water levels in Well 4 and Wells A-G were again measured repeatedly over a period of several days. The data confirmed earlier indications that a water table depression existed in the area of Well 4.

A detailed evaluation of the boring log data for Well 4 showed that a series of clay lenses and silty sands had been penetrated by the bore hole between the depths of 18.5 and 35 feet.

Gravelly sand lies above this zone and medium to fine sand predominates below it. The clay lenses appear to have formed a zone of relatively low permeability separating a perched upper water bearing zone from a lower aquifer. This zone of low permeability was apparently breached by the installation of Well 4. The boring was drilled with a 16-inch diameter auger while the well consisted of 4-inch PVC pipe. The annulus was filled with coarse sand, violating the integrity of the low permeability layer and providing a potential pathway for water from the upper perched water bearing zone to flow down the hole to the lower aquifer, creating a depression in the natural groundwater flow. This appeared to have altered the natural direction of groundwater flow (toward the Willamette River) within a zone of influence surrounding Well 4.

Although the observed water table depression could represent a strong, natural vertical gradient in the vicinity of Well 4, the influence of this well on adjacent wells indicated a strong probability of an induced groundwater sink caused by an unsealed annulus of Well 4. This conclusion was reached by Time upon evaluation of the piezometric surface of the perched water, which indicated that wells in close proximity to Well 4 were apparently influenced by Well 4, showing water level depressions, while wells distant from Well 4 were unaffected.

## Additional Groundwater Monitoring Wells and Well 4 Abandonment (May, 1986)

At Time's direction, three additional groundwater monitoring wells (D, H and I) were installed by Riedel in early May, 1986. The purpose of these wells was to further define the upper piezometric surface and to obtain data on groundwater quality.



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In an effort to reinstate natural groundwater flow patterns in the area and to eliminate possible intercommunication between upper and lower water bearing zones, Well 4 was removed by overdrilling and the hole sealed on May 14, 1986. Prior to choosing this method of abandonment, Time evaluated several possibilities, including pressure grouting and two different overdrilling processes, with input from Hart Crowser and Associates, Century Environmental Sciences and Riedel.

#### Groundwater Sampling (April - May, 1986)

Time retained Century Environmental Sciences to perform group after sampling and analysis of the wells and well points at the in thwest Terminal facility. In April, 1986, Century measured static water levels in Well 4, in Wells A-C and Wells E-G. These measurements again showed that the water level in Well 4 was lower than in surrounding wells. Samples collected from each well were analyzed and .0061 ppm, .0026 ppm and .0014 ppm of PCP were detected in Wells 4, B and F, respectively.

On May 28, following abandonment of Well 4, a second group of groundwater samples were collected from Wells A, B, D, E, F, H and I. The locations of these wells is indicated in Figure 6. The analytical results showed PCP in a concentration just slightly above the detection level (.0002 ppm) in Well I. Other wells contained no detectable levels of PCP.

#### Additional Soil and Groundwater Sampling (August, 1986)

August, 1986, Time retained SRH Associates to perform additional sampling and analysis of soil and groundwater at the Northwest Terminal facility. Based on previous contour determinations. Time re-graded the surface of the woodtreating chemicals tank farm area, gathering all suspected contaminated surface soil in a centralized area, reducing the area to about 60' SRH then collected surface soil samples from the same 14 locations in the tank farm area which had been sampled earlier by Riedel, drilled six holes through the warehouse floor and sampled soil from beneath the building. Samples were collected from the surface of the soil underlying the concrete floor of the warehouse as well as the same five subsurface intervals sampled by Riedel in These borings were made in an effort to determine the extent of contamination underlying the warehouse.

SRH also collected groundwater samples for PCP analysis and pH. and made measurements of static water levels from all monitoring wells in existence. The results of these analyses are supplied in Section III of this report.



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#### SUMMARY

During the duration of the agreement between Time and Koppers, pentachlorophenol and probably some tetrachlorophenol were released into the sandy soil adjacent to the woodtreating chemical warehouse. This material may have been released in combination with various hydrocarbon solvents used as a part of the process. The primary cause for these releases appears to have been intermittent spillage from hoses and mixing vessels during end product formulation and transfer operations, rather than a one-time spill event.

Upon investigation of these findings, Time and Koppers terminated their agreement, ceased all pentachlorophenol operations and began clean up operations at the site.

In investigating the extent of soil contamination, Time has obtained assistance from several consulting firms and clean up contractors, and has analyzed sufficient soil samples to determine the vertical and horizontal extent of contamination. The contamination is localized in the northwest corner of the woodtreating chemicals tank farm, with some slight penetration below the warehouse. An estimated 2,000 cubic yards of soil, a portion of which extends down to the first water bearing zone, is contaminated.

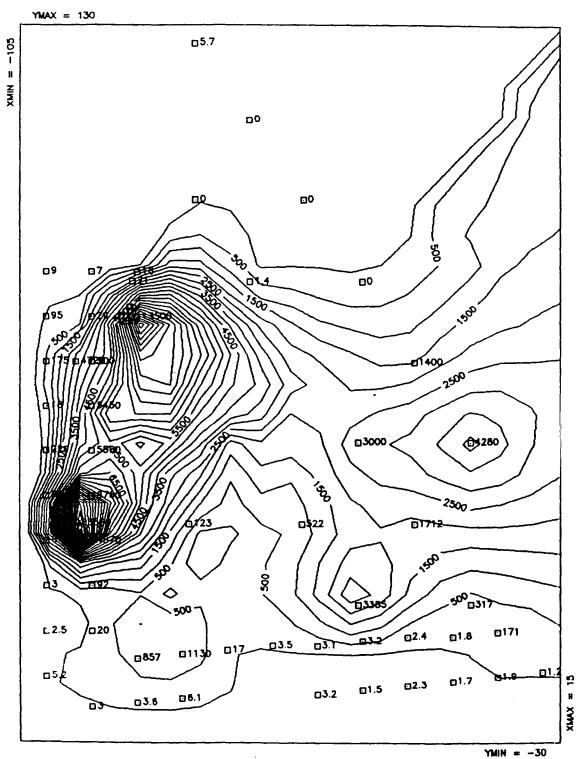
Time has installed an extensive water well monitoring network at the site and is continuously acquiring data on the flow directions and rates of flow of the first water bearing zone, as well as on water quality and PCP concentrations. Early data indicates that gross contamination of the groundwater has not occurred outside of the contaminated zone. PCP can barely be detected in wells in, or immediately adjacent to, the contaminant zone. Groundwater flow is generally in the direction of the Willametter River. Vertical gradients in the vicinity of the contaminant zone have not been determined at this time.

Time attempted to minimize the risk of contaminant migration by disposing of some material at Chemical Waste Management's Arlington facility. This effort was thwarted due to a moratorium on landfilling of PCP subsequently disallowing further such disposal. Time has consolidated the bulk of the contaminated soil into one spot within the woodtreating chemicals tank farm area to facilitate containment and minimize the risk of off-site migration.

Time has now retained SRH Associates to identify available alternatives to destroy or immobilize the PCP contaminated soil and is presently evaluating additionally generated data regarding groundwater quality and soil contamination.

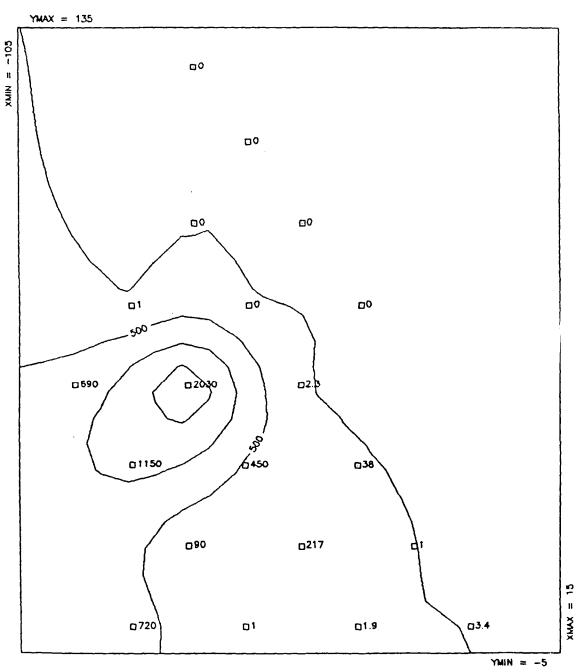


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TIME OIL CO - ORIGINAL SURFACE PCP CONTOURS





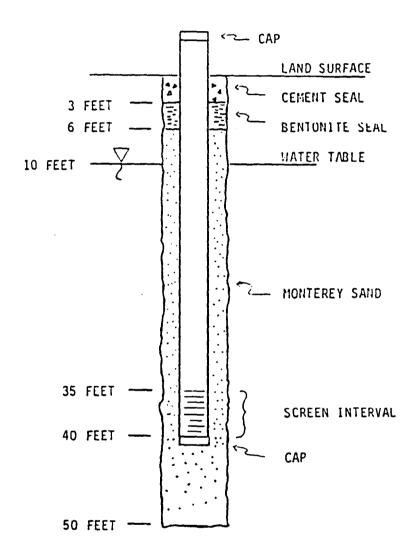
TIME OIL CO - ORIGINAL 12 FOOT PCP CONTOUR



FIGURE 1-3

CONSTRUCTION DIAGRAM FOR

WELL 4



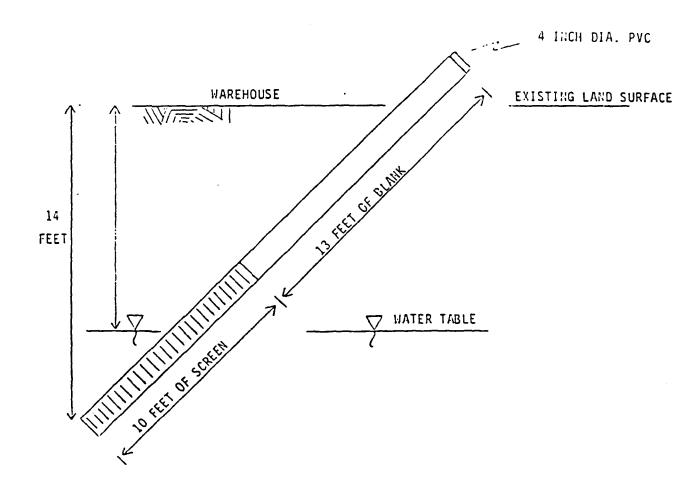
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# FIGURE I-4

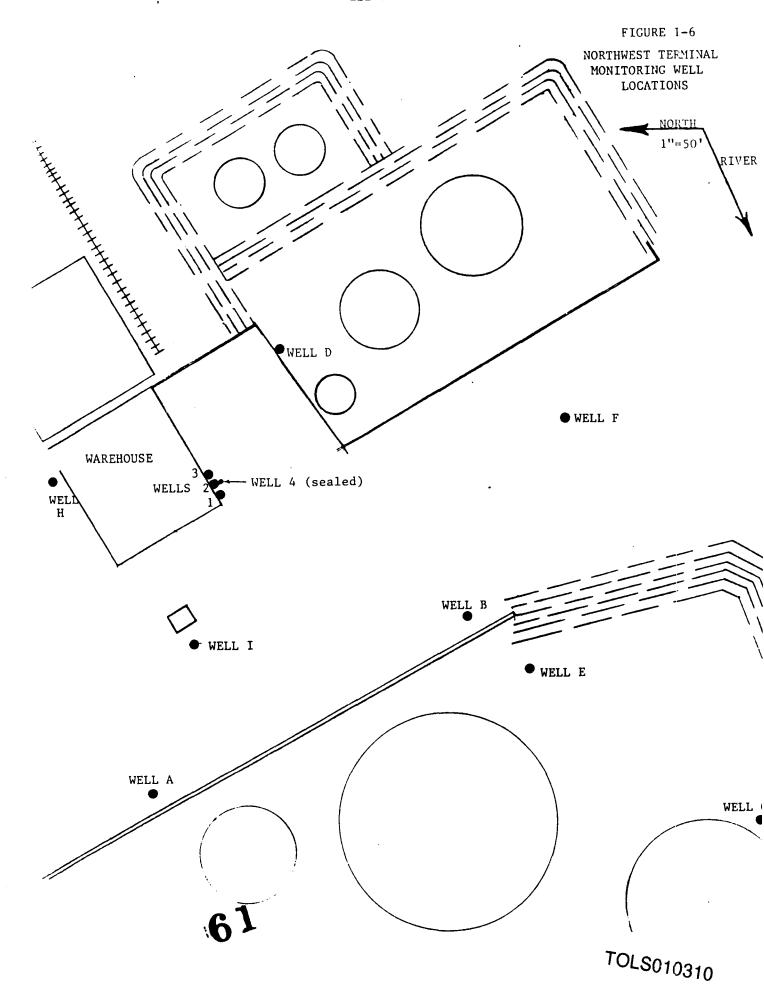
Depth in Feet	BORING LOG WELL 4 Soil Description
0 - 1-1/2	Light brown gravelly sand, moderately compacted, moist (shovel sample)
3-1/2 - 5	Dark brown gravelly sand, moderately compacted, moist, split spoon sample (S.S. sample)
8-1/2 - 10	Light brown gravelly sand, in contact with blue gray gravelly sand, moderately compacted, moist (S.S. sample)
10 - 13	Gravelly sand
13-1/2 - 15	Light blue gray gravelly sand, moderate compaction, saturated (S.S. sample)
15 - 18-1/2	Gravelly sand
18-1/2 - 20	Light blue gray gravelly silty sand with a clay lens, moderately compacted, saturated (S.S. sample)
20 - 23-1/2	Gravelly silty sand with clay lens
23-1/2 - 25	Light gray gravelly silty fine sand with minor clay lens, moderately compacted, saturated (S.S. sample)
25 - 28-1/2	Fine sand
28-1/2 - 30	Light gray medium to fine sand. 3-1/2" thick clay lens. saturated (S.S. sample)
30 - 32-1/2	Medium to fine sand with clay lenses
32-1/2 - 35	Light gray medium to fine sand. minor clay lenses. saturated (S.S. sample)
35 - 37-1/2	Medium to fine grained sand
37-1/2 - 39	Light gray medium to fine sand (S.S. sample)
39 - 42-1/2	Light gray medium to fine sand
42-1/2 - 45	Light gray medium sand grading to fine sand with depth. minor clay lens (S.S. sample)
45 - 47-1/2	Fine sand, saturated
37-1/2 - 49	Light gray sandy silt grading to light gray silty fine sand (S.S. sample)



FIGURE I-5
CONSTRUCTION DIAGRAM FOR
WELLS 1, 2 AND 3



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#### SECTION II

#### REMEDIAL ALTERNATIVE ASSESSMENT

#### INTRODUCTION

A small portion of Time's 45 acre property at 12005 N. Burgard Road in Portland, Oregon has been identified as being contaminated with pentachlorophenol (PCP). Contamination at this site has been found to extend to approximately 70' x 140' in area and to depths of about 15 feet below the surface in one spot. The site was used for the formulation and storage of woodtreating chemicals under an agreement between Time and Koppers from 1967 until 1982. In addition to pentachlorophenol, a number of hydrocarbon solvents and petroleum products were used in this process.

Concentrations of PCP, ranging from below detectable limits to 116,000 ppm, have been detected in the soil, with concentrations generally decreasing with depth and distance from the southwest corner of the woodtreating chemicals warehouse. Concentration data has been used to generate equiconcentration isopleths which indicate that soil contamination is generally restricted to the upper 3 feet of soil, with the exception of a major vertical column of contamination located at the corner of the warehouse.

Perched groundwater underlies the site at a depth of approximately 13 feet below the surface. This water appears to be continuous with and potentially discharging to, the Willamette River. The surface soil consists predominantly of medium-grained sands with occasional minor clay lenses and/or gravels. The soil is characteristically homogeneous from the surface to the perched water table. A layer of somewhat lower permeability underlies the perched water and consists of silty sands with clay lenses. Fine-grained sands predominate below this layer.

Concentrations of PCP in groundwater below the known contaminated zone have not exceeded .044 ppm. Most wells indicate no detectable concentrations of PCP, and outside of the contaminated zone, concentrations have not exceeded .003 ppm in any well. Contamination does not appear to have migrated extensively from the known contaminated zone. Analyses of groundwater are continuing on a quarterly basis.

A water well monitoring network consisting of shallow wells and well points has been installed to monitor the upper perched water. A total of nine vertical and three slanted (45°) wells have been installed and are regularly sampled for pH and PCP plus being measured for static water levels.

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Time is concerned with potential off-site migration of PCP from this source and is determined to eliminate this risk by remediating the site. Due to an existing ban on the land disposal of soil containing pentachlorophenol, excavation and landfilling is not an available remediation alternative (the material at Time has recently been designated by the EPA as RCRA-listed waste FO27 vs. i.s previous U242 designation). Time does not desire to either leave the material in place without corrective action, cap the contaminated area without first eliminating the contamination or excavate and store the waste on site due to the long-term risks associated with these alternatives. Time has performed emergency phase stabilization and containment measures to minimize the risks of contaminant migration.

The following discussion identifies and describes several remedial alternatives which are potentially capable of destroying or immobilizing PCP in sandy soils such as those found at Time. Comments are made regarding soil and groundwater treatment, economics, availability and technical feasibility. This discussion is not intended to represent an indepth feasibility analysis of remediation options, but rather presents a summary review of options which Time may wish to investigate in greater detail.

#### **ALTERNATIVES**

The following alternatives were identified during the preliminary evaluation as remedial methods potentially capable of achieving effective results at Time:

Adsorption onto Polymers or Activated Carbon
Biodegradation
Capping in Place
Chemical Reduction
Closure in Place with Monitoring (No Remedial Actions)
Encapsulation
Excavation and Disposal
High Temperature, Catalyzed Oxidation
Incineration
In-Situ Soil Washing and Surface-Mounted Soil Washing
Ir-Situ Thermal Extraction and Surface-Mounted Thermal Extraction
Sodium Dehalogenation

Of these listed alternatives, excavation and disposal, capping in place, and closure in place are either unavailable due to the regulatory moratorium on landfilling of FO27 material, or do not satisfy Time's requirements for long-term risk reduction. The remaining alternatives are discussed below.



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## Adsorption Onto Polymers or Activated Carbon

Should contaminating PCP, at some point, be removed from the soil by soil washing, thermal extraction or other processes, final treatment of the recovered wastes will be required. Although not a destructive process, sorption of the recovered PCP onto carbon or other polymeric substrates utilizing hydrophobic interactions as a sorptive process, will reduce the volume of PCP contaminated material.

Activated carbon and a variety of organic and silicaceous polymeric adsorbents have been utilized to bind PCP and other phenols. The sorptive process, however, is usually reversible under appropriate conditions (usually temperature elevation or through the use of non-polar solvents) and therefore may not be suitable for long term stabilization of PCP wastes under uncontrolled conditions.

These sorbents may be used to concentrate PCP from a waste stream (i.e. soil washing eluates or thermal extraction scrubber liquors) which could then be recycled or disposed of as a non-hazardous waste. The adsorbent may then be regenerated for reuse and the concentrated PCP solutions so generated, collected for disposal by destructive methods such as incineration or chemical decomposition. Such an approach may be a logical consideration for the Time site.

#### Biodegradation

Biodegradation of man-made compounds has been observed for many years and the results of aerobic sewage treatment systems have been documented in detail. Aerobic landfarming of oily wastes from the petroleum industry has also been in general use for years. Biodegradation occurs under essentially two basic conditions: aerobic (respiratory) and anaerobic (fermentative). Many compounds have been observed to be degraded, either partially or completely to carbon dioxide and water, by one or both of these pathways.

Pentachlorophenol has been observed to undergo degradation by bacteria and fungi. Although PCP degradation has been observed under aerobic conditions, it occurs at a more rapid rate and with fewer complications under anaerobic conditions.

In addition to the biodegradation of pentachlorophenol in soil, it has been documented that fungal enzymes promote the binding of PCP to humic acids in soils, resulting in immobilization of the PCP.

Bench scale studies by SRH Associates scientists have indicated that, under controlled conditions, PCP can be degraded in both aerobic and anaerobic soil environments. Controlling conditions for biodegradation include soil porosity, pH, moisture content, inorganic nutrients (including nitrogen, phosphorus and potassium,

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Eh (oxidation reduction potential), microbial populations and PCP concentrations. Elevated concentrations of PCP are inhibitory or toxic to microbial populations, even under conditions of acclimatization.

The application of biodegradation to the treatment of soils from the site is severely limited due to the existence of high concentration material. PCP degradation, even under optimal conditions, ceases when PCP concentrations are in excess of 1000 ppm. Typically 500 ppm is considered the maximum effective limit. Between 500 and 1000 ppm, degredation effectiveness decreases. Since some material at the site contains PCP in excess of 1000 ppm, not all of the material would be considered ammenable to this treatment without significant dilution or pretreatment to reduce the contaminant concentrations. A large amount of the soil contains PCP at low concentrations however and may be treatable if it can be successfully isolated from the high concentration material found nearby.

Biodegradation may be performed either in-situ or in surfacemounted fermentation reactors. Due to the highly permeable soil at Time, the shallow groundwater table and the possible adsorption of PCP in co-contaminating hydrocarbons which tend to immobilize the PCP, in-situ degradation is considered to present an excessive risk of PCP migration to off-site locations. Additionally, generation of anaerobic conditions in sandy soils is highly difficult. Should a biological process be initiated in-situ, of PCP mobilization significant risk through decomposition, preferential degradation of stabilizing hydrocarbon absorbents, or bio-emulsification of the PCP could be expected. For these reasons a surface-mounted fermenter would be the preferred method for soil treatment at the site.

A surface reactor may be used to directly treat a soil/water suspension, or may be used to treat extracted and diluted contaminants removed from the soil by other technologies. A surface fermenter allows for control of pH, nutrients, Eh, and other critical parameters, as well as preventing the release and migration of waste or waste products.

Nutrients, pH and Eh control are parameters that are easily controlled once optimal process conditions have been identified by bench and pilot scale studies. Co-metabolities or other nutrient augmentation is also easily regulated. Fermenters capable of handling soils such as those found at Time are commercially available, but may be constructed on site for considerable less cost. The requirements of this equipment vary with the amount of material to be treated, the reaction kinetics and the degree of control required.

Much debate currently exists over the benefits obtained by using PCP acclimated, commercially available bacterial preparations to promote degradation vs. using cultures of indigenous bacteria obtained from the site. There is considerable evidence to support



the use of indigenous microorganisms. The effect on the overall cost of the project is similar for both methods. Effective preparations range from \$20 to \$50 per pound of material. Microbial requirements depend on a variety of soil and waste-specific parameters that have not yet been determined at the site.

Costs not directly associated with the on-site remediation include bench and pilot scale tests, engineering, permitting, chemical, biological and physical analyses, agency negotiations, waste delisting and management. These costs are expected to be similar for all of the alternative technologies evaluated here.

#### Chemical Reduction

Oxidation and reduction reactions have been utilized to destroy organic wastes under a variety of circumstances. Due to its high degree of chlorination, PCP is not readily oxidized by such mild oxidants as ozone or hydrogen peroxide. Stronger oxidants present such a great hazard in and of themselves as to be unsuitable for treating wastes (See High Temperature Catalyzed Oxidation).

PCP is, however, readily reduced by sodium borohydride solutions. Staiff (1981) and Sweeney (1981) have both demonstrated the use of catalyzed metal powders and/or borohydride solutions in the oxidation of chlorinated aryls. In-situ techniques have been demonstrated, however competition from reducible soil components may severely limit the reaction, requiring retreatment. This soil reduction chemistry must be identified to allow for proper selection and application of reducing agents.

Reduction, either in-situ or in surface-mounted reactors, has realistic potential for remediating the contamination at Time. The low organic content of the naturally occuring sands in the area, their homogeneity, the low trafficability of the soil, and the nature of the contaminants all support this alternative. Bench and pilot analyses would be required to determine the reduction potential and the products of reduction formed by this process. If technically successful, implementation costs should be moderate.

#### Encapsulation

One method of encapsulation of organic material is through the application of sorbents to the contaminated soil. Sorbents may include carbon granules, polymeric materials or substances in which the waste is soluble. All sorbents must be insoluble in water, inert and not readily degradable in order to achieve long term stabilization of the wastes in question.



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Pentachlorophenol is readily adsorbed by activated carbon granules and is soluble (absorbed) in a variety of organic substances including high molecular weight hydrocarbons such as tar or asphalt. Since both of these materials meet the criteria listed above for acceptable sorbents, they offer a feasible alternative for PCP immobilization. Additionally, both materials are capable of sorbing any petroleum hydrocarbons which may exist in the soil in addition to PCP.

An attractive alternative for immobilization of Time's wastes is the addixing of the PCP contaminated soil with asphalt to form a structurally sound paving material which could then be used to seal the soil surface in the vicinity of the woodtreating chemicals tank farm. This alternative would require an analysis of the leachability of the wastes from the surfacing material and a determination of the structural integrity of the asphalt so produced at various levels of waste incorporation.

### High Temperature, Catalyzed Oxidation

PCP is not ordinarily oxidized by readily available, easily handled oxidizers such as ozone or hydrogen peroxide. Although permanganate, dichromate or other strong oxidizers have been reported to successfully oxidize PCP, their cost, side reactions with soil components, and the environmental hazards generated by them restrict their use in treating contaminated soils. Zimpro has developed a process, commonly referred to as wet air oxidation, which has been successful in destroying phenols and other hazardous compounds in aqueous media.

The Zimpro, Wetox and other processes based on this same principle, employ high temperature and elevated pressures in an oxygen enriched aqueous environment to oxidize and thereby destroy hazardous organics. PCP and other extensively chlorinated organics are refractile to this process without the addition of suitable catalysts which can facilitate the dechlorination of these compounds, rendering them retreatable. Once dechlorinated, the resulting intermediates have increased susceptibility to oxidation by the wet air oxidation process and are degraded to either carbon dioxide and water or to non-toxic biodegradable intermediates.

All wet air oxidation processes are provided as packaged systems by the supplier. Included are the reactor, reagents and operators. Additional support and feasibility testing of representative media can ordinarily be negotiated. Cost of the system, which is provided on a lease basis, is variable dependent upon the volume of material to be treated, the size of the required reactor and the type of process necessary.



## Incineration

Incineration represents a tested and proven method for the destruction of chlorinated hazardous wastes, including PCP. Several types of incineration capacity exist in the U.S. Ordinary incineration, which is not acceptable for chlorinated organics, does not incorporate the appropriate acid scrubbers needed to produce an acceptable air discharge from wastes such as PCP. High efficiency incinerators, (often referred to as "6 nine" incinerators, based on their destruction and removal efficiencies) are capable of treating pentachlorophenol in high concentrations. Incinerators of this type are available in the U.S. as both fixed and mobile units. However, there is not sufficient capacity at this time in either type of unit, to satisfy domestic demands. Although most incinerators can handle liquids, few are equipped to handle solids such as contaminated soil.

Incineration can easily satisfy Time's objectives of reducing long term risk related to the contamination found on site. However, since no small mobile units are available nearby, Time must either absorb significant mobilization, siting and permitting costs or ship its waste to a fixed unit. The attendant risks in shipping must be weighed against those associated with leaving the soil on site.

The nearest incinerator for solid hazardous wastes such as those at the Time facility, is located in Deer Park, TX and is operated by Rollins Environmental. A primary concern with disposal by this alternative is cost. Rollins current price for incineration of contaminated soils is approximately \$0.50 per pound. Based on Time's estimate of 2000 cubic yards of contaminated soil, incineration costs may approach \$2.5 million. This figure does not include excavation, shipping and other associated costs. For comparison purposes, this amount is on the order of five times the cost of landfilling, if this alternative were available to Time.

## In-Situ Soil Washing and Surface Mounted Soil Washing

Removal of contaminants from soil may be accomplished through extraction with a variety of elutriating solutions. The choice of the proper solution must be based on the physico-chemical nature of the contaminants, the effect of the elutriate on the soil geochemistry and its permeability, plus the method by which the eluted contaminants are to be treated for destruction or disposal. Ordinarily, aqueous solutions of acids, bases, surfactants or other compounds are selected (US EPA, 1982).

The effect of washing contaminated soils with water alone, or with mixtures of non-ionic surfactants was investigated by Science Applications International Corp. Their findings indicate that surfactants greatly increased the effectiveness of soil washing when the contaminant of concern was either PCP or a high boiling



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oil fraction. With pentachlorophenol alone, or when used in conjunction with other chlorinated phenols, plain water provided effective washing of the contaminants from a relatively sandy soil (83% sand, 10% silt and clay).

Since the contaminants at Time initially appear to be refractile to natural elution with precipitation or groundwater, surfactants appear to be desirable at this site. The use of alkaline solutions, while ordinarily effective with phenols, may be ineffective at Time due to the possibility of co-contamination with bils or hydrocarbon solvents. Extraction with other hydrocarbon solvents, while likely to effectively extract the contaminating PCP from the soil, will result in the formation of a hydrocarbon contaminated soil requiring an additional purification step.

Two means of applying soil washing methodologies have been identified: in-situ techniques and surface-mounted techniques, (including batch or continuous flow apparatus). In-situ techniques involve the treatment of soil without excavation and provide for the application of the elutriating solvent to the soil surface and recovery of the eluate by using recovery wells in the treatment zone. Surface-mounted systems involve the use of batch extraction tanks or counter-current extraction columns which extract the contaminants under controlled conditions.

In-situ techniques are effective in extracting contaminants only where the soil geology is known to be uniform and where the permeability is high enough to permit adequate percolation of the elutriating solutions through the soil. Additionally, in cases where the distance from the lower limit of the contaminants to groundwater (or alternatively to either a natural or induced low permeability soil layer) is great, excessive amounts of solution are required. Control is reduced and the potential for uncontrolled release of the eluate is great. The technique is well suited for situations where contamination is not generally accessible by ordinary excavation techniques (i.e. below buildings, in developed or heavily utilized areas).

The in-situ process is generally implemented by applying the solution through trickle irrigation or infiltration galleries, and recovering the product through judiciously placed recovery wells. The recovered eluate is treated and, if possible, recycled. A thorough evaluation of all waste components and soil chemistry must be performed to facilitate the selection of a proper surfactant, determine application rates, evaluate recovery potential and to provide information regarding eluate characteristics for the determination of treatment alternatives.

Surface mounted processes are indicated where the distance to groundwater, extraction requirements or heterogeneity of the soil (i.e. channelling, lenses, etc.) require a higher degree of control on the process. In these cases, soil is excavated by suitable procedures and placed into batch or countercurrent continuous extractors. Batch extractors usually involve the



submersion and agitation of batches of contaminated soil in large tanks fitted with a filtration stage to separate the cleaned soil from the eluate. This step is usually repeated until a suitable clean-up standard is achieved.

Countercurrent extractors involve the introduction of contaminated soil into an upwardly moving extraction bed while the elutriating solution is introduced at the top of the bed and allowed to migrate downwards. In this latter process, the cleanest soil (already partially extracted) contacts the cleanest solvent just prior to exiting the column at the top. This continuous process has the advantage of generating less spent solvent requiring subsequent treatment than does the batch process. It requires a higher degree of process control but is generally less labor and energy intensive than a batch process. A continuous process also allows for the fitting of a second solvent stage to elute any residual surfactant from the treated soil where water was used.

The cost of soil washing is expected to be moderate, however this process does not address the final destruction and/or disposal of the recoverd solutions. These solutions, containing PCP, water, surfactants, and possibly hydrocarbons, must be treated by incineration, biodegradation, immobilization, recycling or by chemical processes prior to completion of the project. The extraction process and the treatment process should be determined in conjunction with one another in order to maximize their mutual effectiveness.

## In-Situ Thermal Extraction and Surface Mounted Thermal Extraction

Thermal extraction processes involve the introduction of heat to the contaminated soil mass to increase the vapor pressure of the contaminants, rendering them sufficiently volatile to allow their recovery as a vapor. As might be expected, these processes work best with relatively volatile contaminants that tend to remain free, rather than binding to soil components. Additionally, the processes work best in friable or loose-grained soils which allow free permeation of the vapors and their subsequent release to the recovery system.

Coia (1985) has presented a system for recovery of volatiles from contaminated soils using an in-situ process. This system consists of a network of thermal injection wells and extraction wells connected to injection and extraction blowers, respectively. Although the system was intended for extraction of TCE from glacial sands, any compound that can be brought to exert a significant vapor pressure can be recovered with this system.

A similar system utilizing a modified drilling rig has been developed by ATW Calweld. This firm, a manufacturer of drilling equipment has modified the kelly of a drilling rig to incorporate several channels which allow the introduction of hot air, steam and various chemicals, if appropriate. The equipment rapidly



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agitates the soil while applying heat and volatilizes contaminants which are then recovered in a negative pressure hood surrounding the surface of the rig. Contaminant vapors are drawn off to a cyclone and scrubber system. Although the device has only been demonstrated on hydrocarbon spills (gasoline and diesel oil), ATW Calweld suggests that the process is applicable to lower volatility compounds such as pentachlorophenol.

Thermal extraction in surface units has been advanced by several firms. American Toxic Disposal in Waukegan illinois, has operated a 10-ton-per-day unit which has successfully removed PCB's from contaminated soils and sludges. This system has been demonstrated to the EPA and is currently being used to treat material containing PCB's in Gary, Indiana.

As with soil washing techniques, thermal extraction techniques do not destroy contaminants, which must be recovered and treated or immobilized by other techniques. The process does, however, result in a volumetric reduction of the contaminated soil by 10 to 100 fold, allowing consideration of incineration as a final destruction alternative.

Thermal extraction processes are viable candidates for treating Time's contaminated soils since the soil at Time is friable and loose-grained. A preliminary consideration to be addressed before selecting this process is the degree of volatility of the contaminants in the matrix found at Time. Since moisture does not present a major deterrent to thermal processes, saturated material may also be successfully treated.

## Sodium Dehalogenation

Both Acurex and the Franklin Institute have developed processes whereby soils are extracted (similar to Soil Washing, above) and subjected to dehalogenation using sodium based proprietary compounds. Although the process has been primarily utilized for PCB destruction, it appears to be ammenable to chlorinated phenols as well.

The Acurex process is less stable and more sensitive to interference from water than is the Franklin Institute process, which uses a specially modified sodium/polyethylene glycol complex. The Franklin Institute process has been applied directly to soils in an in-situ operation.

These procedures have been used primarily in the destruction of PCB oils and have only recently been used to treat contaminated soils. PCP has not been treated by this process. Adaptation to the Time site may be possible but should be pursued only if other demonstrated technologies do not prove successful in pilot demonstrations.



#### SUMMARY

Twelve alternative processes have been identified for isolation, immobilization, separation and/or destruction of PCP contaminated soil found at Time. The selection of any one or a combination of these alternatives requires additional characterization of the wastes found at the site. Among the additional data that may be required are:

Adsorption Isotherms of Wastes on Soil and Carbon Biodegradability of Waste Constituents (Half-life and Rate Constant)

Biodegradation Products

Bioinhibition Threshold Concentration of Waste Constituents

Characterization of Co-contaminants (if any)

Climatic Conditions

Determination of Soil pH

Determination of Soil Particle Size Distribution

Groundwater Parameters (Flow Rates, Storage Coefficient)

Organic Carbon and Octanol/Water Partition Coefficients of Waste Components

Oxidation/Reduction Potentials of Waste Constituents

Required Clean-up Levels

Soil Microflora

Soil Moisture Content

Soil Nutrient Concentrations (N, P & K ratios)

Soil Organic Matter

Soil Oxygen Concentration

Soil Permeability

Soil Temperature

Surfactant Solvation Efficiency (for Each Waste Constituent)

Trafficability of Soil and Site

Waste Constituent Vapor Pressure Curves

While other information may be needed for each specific alternative, some of the above data may also be necessary. depending on method selected.

It should be remembered that separatory procedures such as soil washing or thermal extraction will require additional disposal or destructive treatment processes as a final step. Surface mounted separatory or treatment processes will require excavation, containment and storage steps prior to implementation.

A recommended course of action for the determination and selection of a remedial technique for the Time site involves additional definition of the waste constituents, clarification of soil parameters, further definition of groundwater conditions and determination of site specific conditions listed above. Following



these determinations, the specific questions of technical feasibility of the various alternatives listed above can be addressed.

With this information, alternatives may then be selected with a greater degree of confidence and further pursued by performing bench scale tests to evaluate their applicability to the contaminated soils found at Time. Bench scale conditions can then be scaled up to pilot level demonstrations, either on-site or at supplier's test facilities. Finally, these data may then be used to develop and obtain required treatment permits from appropriate State/Federal agencies. The generally accepted approach to selecting an operational treatment procedure is to evaluate the most logical alternative first and if it proves unsatisfactory due to site specific or economic factors, evaluate the next logical option.

#### RECOMMENDATIONS

Based on existing information, the following is recommended:

- a. Select the "Surface Mounted Soil Washing" technique as the most logical remedial approach.
- b. Perform bench scale and pilot level evaluations.
- c. Determine necessary destruction steps of recovered extracts.
- d. Ascertain technical permitting and economic feasibility of technique for final disposal action.
- e. Compare results with repeat step by step examination of next most logical remedial approaches which are: "Surface Mounted Thermal Extraction" and "In-Situ Thermal Extraction".

Bench scale evaluations of a surface mounted, countercurrent soil washing process involve the excavation of contaminated soils, temporary storage of the soils on an impervious slab, extraction of the contaminants with an aqueous solution of nonionic surfactants, removal of the surfactants by countercurrent washing with water, recovery and treatment of the rinsates, their analysis and on-site placement of the purified soils. The contaminated rinsates would then be subjected to a destruction step that can only be determined based on the constituents in the recovered extracts, but may include chemical reduction, incineration, biodegradation or other processes outlined earlier. A schematic drawing of a proposed process is shown in Figure II-1.



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The actual process consists of the physical excavation of contaminated soil using classical techniques and the temporary storage of the excavated soils on an impervious, protected surface. Material from this location would be transferred to an infeed hopper connected to a primary extractor or soil washer. The soil would be introduced into the lower section of the extractor via a screw feed auger. Once in the extractor, the soil would be agitated and conveyed upwards while extracting solvent [an aqueous solution of nontoxic, nonionic detergents (surfactants)] is introduced into the top of the extractor. The extraction would take place in a countercurrent fashion, producing a cleaned soil product and contaminated elutriate in a continuous process.

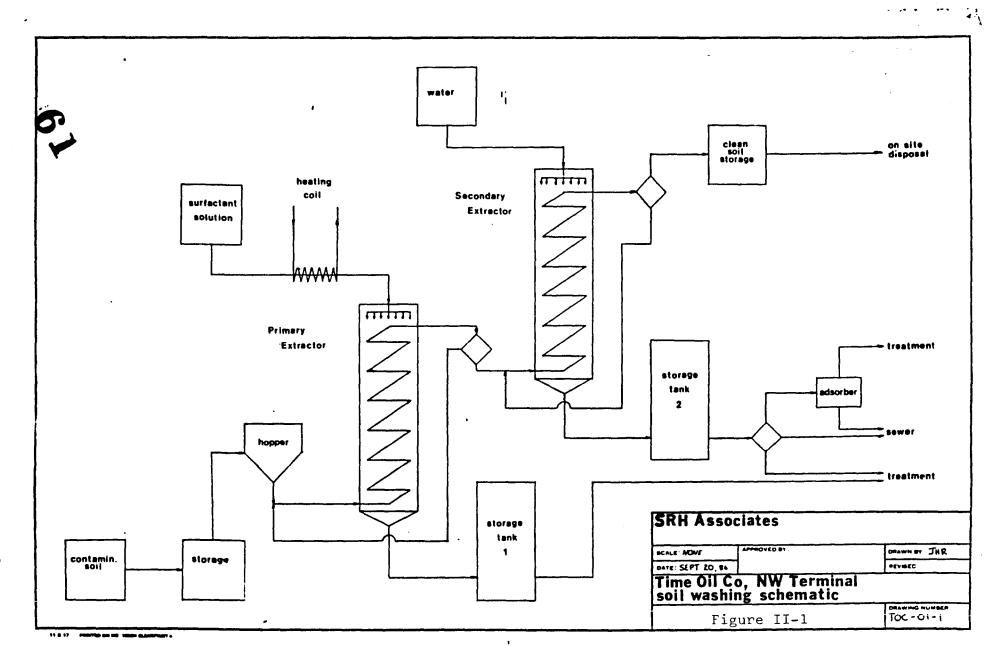
Cleaned soil would then be subject to rinsing with clean water in a secondary extractor, operated similarly to the primary extractor, to reduce or eliminate residual surfactant concentrations, allowing the soil to be returned to the site. The contaminated fluids would be stored, tested and treated to effect ultimate disposal. Analytical decision points are noted as diamonds in Figure II-1. There are three. It is possible that surfactant solutions with suitably low or undetectable levels of PCP could be discharged to the sanitary sewer.

The process can easily be modelled in bench scale experiments and the technical feasibility of the process can be accurately determined. The nature and required concentrations of the surfactants, soil retention times, elution rates and contaminant loading factors can all be determined to allow approximation of full scale process operating parameters. Following determination of these parameters, scale up protocols and economic feasibility may accurately be determined.

Soil washing is recommended since it has been successfully applied to soils contaminated with PCP in pilot studies on similar soil types and does not use hazardous materials which may interact with or be retained by the soil. The process should be directed towards a surface, rather than in-situ technology to improve process control and to minimize the chance of uncontrolled releases to the environment. Residual surfactants may be eliminated from the soil using only water, and surfactants can be modified to remove PCP as well as co-contaminating hydrocarbons, which may also be present.

The aqueous extracts so produced may be subjected to a variety of concentrating and destructive steps to remove the entrained PCP and hydrocarbons, placing a wider array of treatment alternatives at Time's disposal.







#### SECTION III

#### ANALYSIS RESULTS

## INTRODUCTION

During August of 1986, Time retained SRH Associates to collect samples of surface and subsurface soil and groundwater from the Time Facility located in Portland, Oregon. The samples were analyzed for pentachlorophenol (PCP) in an effort to further existing data concerning past releases of this chemical from a woodtreating chemicals formulating operation at this site.

Samples of surface soils were collected from an earthen tank farm area located south of the woodtreating chemicals warehouse and from six locations below the concrete floor of the warehouse itself. Additional samples were taken from five other depths below the warehouse floor from the same holes as the surface samples. Groundwater was sampled at seven existing monitoring wells surrounding the woodtreating chemicals area and was analyzed for PCP and pH. Static water levels were determined in these wells and at a monitoring station for the measurement of Willamette River water elevations located on the Northwest Terminal Facility pier.

## SURFACE SOIL SAMPLING AND ANALYSIS

Following the contaminated soil relocation to one pile, surface soils were collected from 17 locations in the woodtreating tank farm area. The locations were identical to those sampled by Riedel Environmental Services during initial samplings performed in 1985. Samples were obtained from 2 to 3 inches below the soil surface to reduce the risk of contamination arising during set up procedures at the sample site.

Additionally, six locations inside the warehouse were sampled by coring through the concrete with abrasive saws. The six locations were selected by Time and represent an extension of the triangular sampling grid employed by Riedel in the 1985 study. Samples were obtained from an interval of 3.5 to 5.5 feet below the lower



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surface of the concrete using split spoon samplers. The sampling procedure used will be described in the next (Subsurface Samples) part. The selected depth was chosen to position the samples at the same true elevation as the surface samples taken from the tank farm area. Samples of soil from 2 to 6 inches below the lower surface of the concrete floor were obtained and held for possible future analysis.

Samples were obtained using stainless steel sampling spoons which had been previously cleaned with sequential washings of laboratory detergent, tap water, hexane, tap water, trisodium phosphate and sodium carbonate in water, tap water and distilled water (3X). Samples were screened through 0.10 inch stainless steel mesh which had been similarly cleaned. The screened material was allowed to fall directly from the screens into pre-washed 8 ounce glass jars fitted with screw cap closures and teflon liners. The containers had been cleaned to EPA specifications and were not opened prior to read ving the sampled material.

Samples were field logged and containers were marked with the date time, location, sample code, requested analyses and other relevant data. Lids were replaced with care being taken to ensure that no interference with the hermetic seal occurred. Tamper indicating seals were applied, chain of custody and analysis request forms were completed and the samples placed on ice prior to transport to the laboratory. Samples were delivered to the laboratory within 48 hours of collection in all cases. No preservatives were added to soil samples.

Samples were extracted in the laboratory using method number 3540, Soxhlet Extraction, as described in EPA publication SW 846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. The extract so obtained was analyzed for pentachlorophenol by method 8040, Phenols, as described in EPA publication SW 846. Field and laboratory duplicates were analyzed and spiked sample recovery efficiencies were determined. Laboratory blanks were analyzed. No field blanks of soil were submitted. All quality control results indicated acceptable performance of sampling and analysis.

The results of the surface soil samples are listed, along with the X and Y coordinates of their respective sampling locations, in Table III-1. The coordinates are referred to a temporary bench mark located at the end of a concrete wall at the southeast corner of the woodtreating tank farm area. The coordinates are given in feet. The X axis is aligned in an approximately northeast southwest plane while the Y axis is aligned in an approximately northwest - southeast plane at at 90° to the X axis.

The results listed in Table III-1 were subjected to Kriging analysis to generate lines of equal concentration (equiconcentration isopleths). A .95 smoothing ratio and a search radius of 213 feet was used for generation of the contours which are shown in Figures III-1 to III-4. The sample sites and their respective concentrations are indicated. The contours are to



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scale (l'' = 20 feet) and can be overlaid on the associated plan drawing of the sampled area. (Figure III-5).

The results indicate that the bulk of the surface contamination exists in a pile of material located in the vicinity of sample point S. Additional contamination is located to the east of point S, continuing to approximately the concrete wall bordering the tank farm on the east. The strong focal point of contamination located at point K has generated a broad area of calculated contamination on the Kriging generated contour maps. Due to the lack of supporting high concentrations of PCP adjacent to point K, it is concluded that this contour is primarily artifactual, generated by the data reducing program in response to the single very high concentration detected at K. It is more likely that K represents a small focus of high concentration, rather than the large area implied by the contours.

Most contamination that had been previously detected to the west of the woodtreating tank farm area appears to have been removed during recent excavation activities performed by Time. This is reflected by the low results found at points M and U.

Two locations beneath the warehouse floor were found to contain low levels of PCP. Borings 1 and 5 contained 5.7 and 1.4 ppm of PCP, respectively. It should be noted, however, that despite stringent efforts to prevent contamination, blowing winds and "dust devils" were noted during sampling and were observed picking up soil from the tank farm area and warehouse floor. Because of these concerns, the low levels noted in these samples are probably a result of field contamination.

#### SUBSURFACE SAMPLES

Samples were obtained from six depths below the lower surface of the concrete floor in the woodtreating chemicals warehouse. Six locations, determined by Time and located at extensions of the triangular sampling grid developed by Riedel, were sampled. The approximately 6 inch thick concrete floor was cored using an abrasive wheel. Twelve inch diameter holes were cut. The surface of the concrete within a 6 foot radius of the hole was swept clean and covered with .005 inch thick polyethylene film to minimize contamination from residue found in the warehouse.

The upper 2 to 3 inches of soil in the hole was removed to eliminate contamination with cuttings generated during the coring and set up operations. A sample was subsequently obtained using the technique given above, from the exposed surface of the hole. The holes were designated as numbers 1 through 6. The surface sample was collected and held for future analysis.



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Following collection of the surface sample, the hole was advanced using a hand operated, 2 1/2 inch (O.D.) continuous flight auger. Samples were obtained at the following intervals below the upper surface of the concrete floor using a 2 inch (O.D.) split spoon sampler:

```
3.5 to 5.5 feet ( 0 )
5.5 to 7.5 feet ( 2 )
7.5 to 9.5 feet ( 4 )
10.5 to 12.5 feet ( 7 )
15.5 to 17.5 feet ( 12 )
```

Since he upper surface of the concrete floor was 3.5 feet above the currounding soil surface, the five depths listed above were equivalent to the 0 to 2 foot, 2 to 4 foot, 4 to 6 foot, 7 to 9 foot and 12 to 14 foot intervals sampled in the woodtreating tank farm area by Riedel in 1985.

Samples were taken by removing the drill from the bore hole and inserting the split spoon sampler into the bore hole taking care not to dislodge any material from the surface or walls of the hole. The sampler was driven into the soil using a 20 lb. hammer. Hand drilling and driving of the penetrometer/sampler was required due to the inaccessibility of the site to conventional drill rigs and to the low overhanging roof of the warehouse.

Samples were extruded by gently tapping the soils out of the sampler onto stainless steel screens, which were cleaned as indicated above. The samples were screened, placed into jars, labelled, logged and handled as described above. Samplers were cleaned after each use, using the decontamination procedures described above. The drilling equipment was decontaminated between holes and prior to leaving the site. All decontamination water was impounded in D.O.T. 17 E drums until proper disposal requirements could be established based on analytical results.

During drilling, saturated conditions were encountered at the 12 foot interval in all holes. No groundwater samples were taken from any location. All soil samples consisted of medium grained grey - brown to blue sands. Cobbles were encountered in holes number 1 and 2 at a depth of approximately 3 feet below the floor surface. The cobbles were associated with a minor clay lens approximately 2 inches thick.

Following drilling, holes were abandoned through the addition of bentonite pellets to a depth of 13 feet below the concrete floor. The remainder of the hole was filled with bentonite grout to the surface. The concrete core plugs removed during coring of the warehouse floor were replaced in the hole and bedded with bentonite in accordance with Time's request.

The samples were refrigerated and shipped to the laboratory for PCP analysis as outlined above. The results, together with the X and Y coordinates of the sample points, are presented in Tables



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III-1 through III-4. The data from these analyses have been combined with the results obtained by Riedel at the sample locations labelled J through Z in 1985, for the nominal sampling depths 2, 4, 7 and 12, to generate concentration isopleths at these depths.

The data listed in these tables was analyzed by Kriging analysis according to the procedure given above. The results of the contouring are shown in Figures III-1 through III-4. Figure III-5 shows the sample locations on a plan drawing of the woodtreating chemicals warehouse. Figure III-6 incorporates the X and Y coordinates of the sample locations on this drawing.

The results indicate that contamination is restricted to the woodtreating tank farm area with virtually no contamination being found beneath the central and northern portions of the warehouse. There is significant PCP contamination below the surface of the southwest corner of the warehouse, which appears to be continuous with a vertical column of contamination located immediately adjacent to this area in the tank farm.

Excavations in the woodtreating tank farm area have perturbed the original conditions of the site, and therefore the surface and 2 foot contours are not expected to be representative of conditions existing prior to the movement of soil. This can be seen by the distortion of the vertical column of contamination at the surface and two foot intervals, due to the fact that soil at these sites had been removed and replaced with soils from other areas within the woodtreating tank farm. A computer generated topographic grid net of the woodtreating tank farm and warehouse area can be seen in Figure III-7.

The 4, 7 and 12 foot contours reflect the strong vertical plume of PCP contamination which decreases to about 2000 ppm at the 12 foot depth. A minor lobe of this plume appears to extend to the southeast into the lower corner of the woodtreating tank farm area at or around the seven foot interval. The vertical plume appears to widen and diffuse to the south at the 12 foot contour, presumedly due to the presence of groundwater at or near this sampling depth.

## GROUNDWATER ANALYSES

The nine vertical groundwater monitoring points at Time (See Figure I-6, Section I) were measured for static water levels and tested for pH and PCP. The three slant borings located at the southwest corner of the warehouse were not examined. The wells, which had been previously installed by Time employees or other contractors, consist of 1 1/4 and 2 inch (I.D.) stainless steel well points and 2 inch (I.D.) PVC screen and casing.



- 26 -

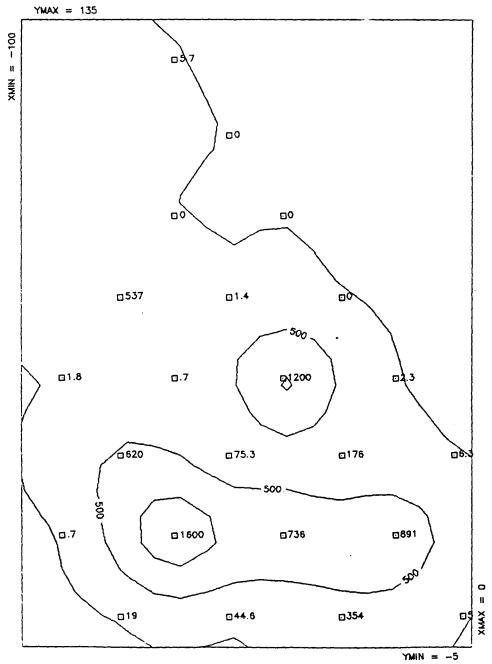
The water level elevations in the wells, labelled A through I, were measured to the nearest .01 foot from the top edge of the casing at a scribed mark located on the north side of the casing. A Fisher M-Scope previously calibrated against a steel tape was used to obtain the measurements. Standing bore volumes of well water were calculated based on these measurements and well construction drawings provided by Time. A measurement of the Willamette River water elevation relative to a mark located by Time on its unloading pier was also taken.

Stainless steel weighted bailers were used to remove at least 4 standing bore volumes of water prior to collecting representative samples of groundwater. The bailers had been previously cleaned by the procedure described above, and were re-cleaned after each well was sampled. The purged water was collected into D.O.T. 17 E drums until proper disposal could be determined based on analytical results.

The samples were dispensed directly from the bailer into two 1 liter amber glass bottles fitted with screw cap closures and teflon liners for PCP analysis. Samples were adjusted to pH 2 with 1:1 Sulfuric Acid in distilled water and checked with pH paper prior to refrigeration and delivery to the lab. Samples for pH analyses were dispensed directly into 250 ml polyethylene wide mouthed bottles without preservatives. pH analyses were performed within 2 hours of sample collection using a silver-silver chloride electrode standardized against two NBS traceable reference reference buffer solutions. Samples were logged, labelled, sealed and transferred to the laboratory within 6 hours of collection. Analyses for PCP were performed as above, except that the sample was not filtered prior to analysis, and was extracted by method 3510, Separatory Funnel Liquid - Liquid Extraction, as described in EPA publication SW 846.

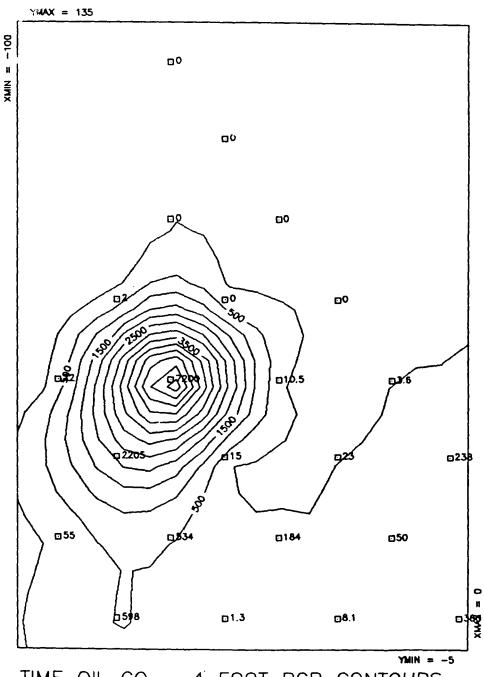
The results of the groundwater investigation are shown in Table III-6. Wells C and G were dry and could not be sampled. The pH ranged from 6.53 to 6.91. The only well showing detectable PCP was well D, in which .044 ppm was detected. Well D is located southeast of the woodtreating chemicals warehouse.





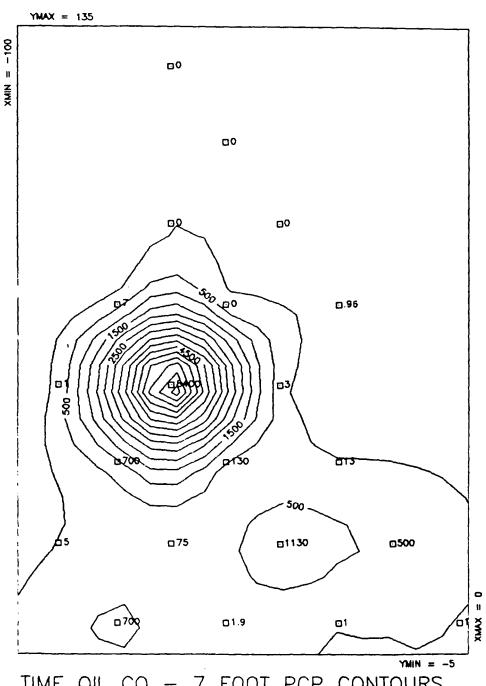
TIME OIL CO - SURFACE PCP CONTOURS





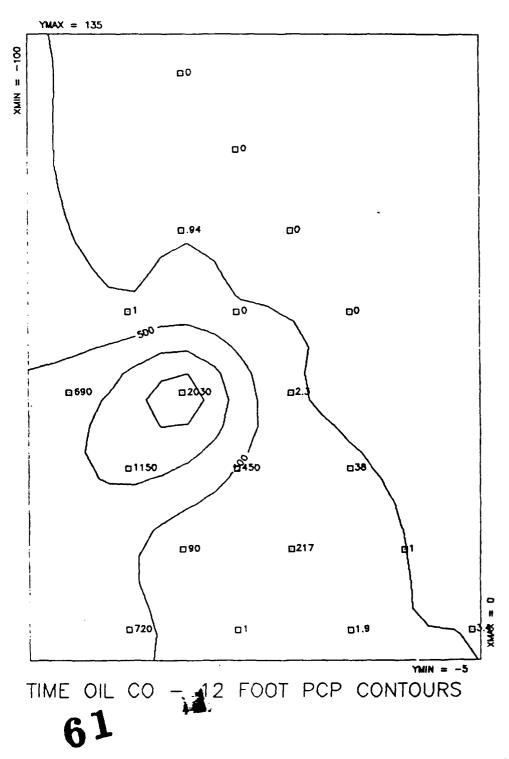
TIME OIL CO - 4 FOOT PCP CONTOURS





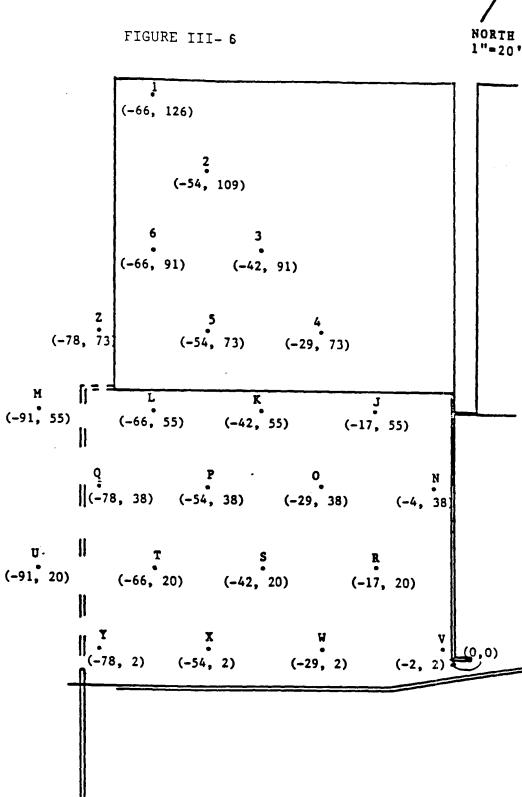
TIME OIL CO - 7 FOOT PCP CONTOURS





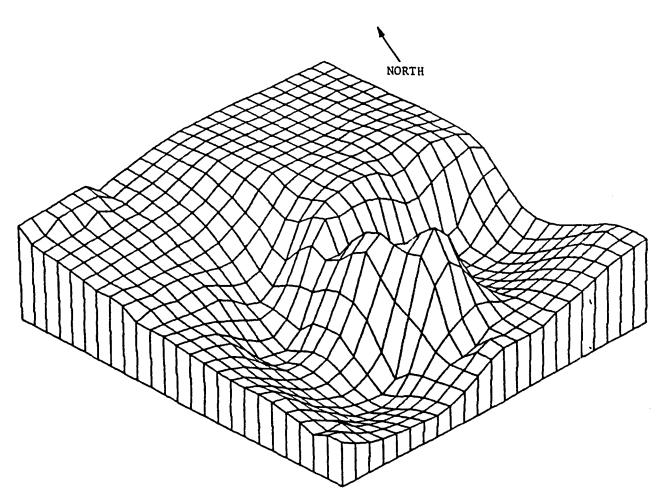
TOLS010336

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6)

# FIGURE III- 7 APPROXIMATE SURFACE TOPOGRAPHY WOOD TREATING CHEMICALS AREA



TIME OIL CO. - TOPOGRAPHY



TIME OIL CO.

# COORDINATES - SURFACE PCP CONTOUR

CODE	X	Y	[PCP]
J	-17	55	2.3
K	-42	55	1200
L	-66	55	0.7
М	-91	55	1.8
N	-4	38	6.3
0	-29	38	176
P	-54	38	75.3
Q	-78	38	620
R	-17	20	891
S	-42	20	736
T	-66	20	1600
ប	-91	20	0.7
V	-2	2	5
W	-29	2	354
Х	-54	2	44.5
Y	-78	2	19
Z	-78	73	537
6	-66	91	0
5	-54	73	1.4
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	5.7

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)



TIME OIL CO.

COORDINATES - 2 FOOT PCP CONTOURS

CODE	x	Y	[PCP]
J	-17	55	3
K	-42	55	8.8
M	-91	55	87
N	-4	38	3.1
0	-29	38	59
P	-54	38	16
R	-17	20	34
S	-42	20	252
T	-66	20	123
บ	-91	20	44
v	-2	2	260
W	-29	2	15
X	-54	2	4.5
Z	-78	73	14
6	-66	91	0
5	-54	73	5.6
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)



TIME OIL CO.

# COORDINATES - 4 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
J	-17	55	3.6
K	-42	55	10.5
L	-66	55	7200
M	-91	55	22
N	-4	38	238
0	-29	38	23
P	-54	38	15
Q	-78	38	2205
R	-17	20	50
S	-42	20	184
T	-66	20	534
ប	-91	20	55
V	-2	2 2	380
W	-29	2	8.1
X	-54	2	1.3
Y	-78	2	598
Z ·	-78	73	2
6	-66	91	0
5	-54	73	0
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)



TIME OIL CO.

## COORDINATES - 7 FOOT PCP CONTOURS

K       -42       55       3         L       -66       55       8400         M       -91       55       1         O       -29       38       13         P       -54       38       130         Q       -78       38       700         R       -17       20       500         S       -42       20       1130         T       -66       20       75         U       -91       20       5         V       -2       2       1         W       -29       2       1         X       -54       2       1.9         Y       -78       2       700         Z       -78       73       7         6       -66       91       0         5       -54       73       0.96         3       -42       91       0         2       -54       109       0         1       -66       126       0	CODE	X	Y	[PCP]
L -66 55 8400 M -91 55 1 O -29 38 13 P -54 38 130 Q -78 38 700 R -17 20 500 S -42 20 1130 T -66 20 75 U -91 20 5 V -2 2 1 W -29 2 1 X -54 2 1.9 Y -78 2 700 Z -78 73 76 -66 91 0 5 -54 73 0 4 -29 73 0.96 3 -42 91 0	ĸ	-42	55	3
M -91 55 1 O -29 38 13 P -54 38 130 Q -78 38 700 R -17 20 500 S -42 20 1130 T -66 20 75 U -91 20 5 V -2 2 1 W -29 2 1 X -54 2 1.9 Y -78 2 700 Z -78 73 76 -66 91 0 5 -54 73 0.96 3 -42 91 0 2 -54 109 0		-66	55	
O -29 38 13 P -54 38 130 Q -78 38 700 R -17 20 500 S -42 20 1130 T -66 20 75 U -91 20 5 V -2 2 1 W -29 2 1 X -54 2 1.9 Y -78 2 700 Z -78 73 7 6 -66 91 0 5 -54 73 0 4 -29 73 0.96 3 -42 91 0	M	-91	55	
Q       -78       38       700         R       -17       20       500         S       -42       20       1130         T       -66       20       75         U       -91       20       5         V       -2       2       1         W       -29       2       1         X       -54       2       1.9         Y       -78       2       700         Z       -78       73       7         6       -66       91       0         5       -54       73       0.96         3       -42       91       0         2       -54       109       0	0	-29	38	13
Q       -78       38       700         R       -17       20       500         S       -42       20       1130         T       -66       20       75         U       -91       20       5         V       -2       2       1         W       -29       2       1         X       -54       2       1.9         Y       -78       2       700         Z       -78       73       7         6       -66       91       0         5       -54       73       0.96         3       -42       91       0         2       -54       109       0	P	-54	38	130
R -17 20 500 S -42 20 1130 T -66 20 75 U -91 20 5 V -2 2 1 W -29 2 1 X -54 2 1.9 Y -78 2 700 Z -78 73 7 6 -66 91 0 5 -54 73 0 4 -29 73 0.96 3 -42 91 0 2 -54 109		-78	38	700
S       -42       20       1130         T       -66       20       75         U       -91       20       5         V       -2       2       1         W       -29       2       1         X       -54       2       1.9         Y       -78       2       700         Z       -78       73       7         6       -66       91       0         5       -54       73       0         4       -29       73       0.96         3       -42       91       0         2       -54       109       0	R	-17	20	500
T -66 20 75 U -91 20 5 V -2 2 1 W -29 2 1 X -54 2 1.9 Y -78 2 700 Z -78 73 7 6 -66 91 0 5 -54 73 0 4 -29 73 0.96 3 -42 91 0 2 -54 109 0	S	-42	20	1130
U       -91       20       5         V       -2       2       1         W       -29       2       1         X       -54       2       1.9         Y       -78       2       700         Z       -78       73       7         6       -66       91       0         5       -54       73       0         4       -29       73       0.96         3       -42       91       0         2       -54       109       0	T	-66	20	
W     -29     2     1       X     -54     2     1.9       Y     -78     2     700       Z     -78     73     7       6     -66     91     0       5     -54     73     0       4     -29     73     0.96       3     -42     91     0       2     -54     109     0	U	-91		
W     -29     2     1       X     -54     2     1.9       Y     -78     2     700       Z     -78     73     7       6     -66     91     0       5     -54     73     0       4     -29     73     0.96       3     -42     91     0       2     -54     109     0	V	-2	2	1
Y -78 2 700 Z -78 73 7 6 -66 91 0 5 -54 73 0 4 -29 73 0.96 3 -42 91 0 2 -54 109 0	W	-29		
Y -78 2 700 Z -78 73 7 6 -66 91 0 5 -54 73 0 4 -29 73 0.96 3 -42 91 0 2 -54 109 0				1.9
Z     -78     73     7       6     -66     91     0       5     -54     73     0       4     -29     73     0.96       3     -42     91     0       2     -54     109     0		-78		
6 -66 91 · 0 5 -54 73 0 4 -29 73 0.96 3 -42 91 0 2 -54 109 0	Z		73	
4     -29     73     0.96       3     -42     91     0       2     -54     109     0		-66	91 -	0
3 -42 91 0 2 -54 109 0	5	-54	73	0
2 -54 109 0	4	-29	73	0.96
2 -54 109 0	3	-42	91	
				0
	1			

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)



# TABLE III-5

TIME OIL CO.

# COORDINATES - 12 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
K	-42	55	2.3
L	-66	55	2030
M	~91	55	690
0	-29	38	38
P	-54	38	450
Q	-78	38	1150
R	-17	20	1
S	-42	20	217
T	-66	20	90
V	-2	2	3.4
W	-29	2	1.9
X	-54	2	1
Y	-78	2	720
Z	-78	73	1
6	-66	91	0.94
5	-54	73	0
4	-29	73	0
3	-42	91	Ō
2	-54	109	Ō
ī	-66	126	Ō

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)



# TABLE III-6

TIME OIL CO.

# GROUNDWATER ANALYTICAL RESULTS

(AUGUST 29, 1986)

WELL NUMBER	STATIC WATER LEVEL	РH	[PCP]
	(FT BELOW TOP OF CASING)		(mqq)
MW-A	14.06	6.80	N.D.
MW-B	15.07	6.70	N.D.
MW-C	DRY	N.A.	N.A.
MW-D	14.48	6.53	.044
MW-E	15.22	6.54	N.D.
MW-F	15.44	6.57	N.D.
MW-G	DRY	N.A.	N.A.
MW-H	11.28	6.91	N.D.
MW-I	14.75	6.77	N.D.
RIVER	25.70	N.A.	N.A.

## NOTES:

[PCP] = CONCENTRATION OF PENTACHLOROPHENOL

ppm = PARTS PER MILLION
N.A. = NOT AVAILABLE
N.D. = NOT DETECTED





SRH Assocates, Inc. P.O. Box 14005 Portland, Oregon 97214 Attention: John Ruddick

Analysis Requested: Pentachiorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS
J-O - Surface-N.E. Tank Farm	2.3
K-O - Surface-N. Tank Farm	2964
L-O - Surface-N.W. Tank Farm	0.7
M-O - Surface-N.W. Tank Farm	1.8
N-O - Surface-E, Tank Farm	6.3
0-0 - Surface-N.E. Central Tank Farm	176
P-O - Surface-N. Central Tank Farm	75.3
Q-0 - Surface-N.W. Central Tank Farm	620
R-O - Surface-E. Central Tank Farm	891
S-0 - Surface-S.E. Central Tank Farm	736
T-O - Surface-N. Central Tank Farm	1600
U-O - Surface-W. Central Tank Farm	0.7
V-O - Sunface-S.E. Tank Farm	5.0
W-O - Surface-S. Tank Farm	354
X-0 - Surface-5. Tank Farm	44.6
Y-0 - Sunface-S.W. Tank Farm	19
Z-O - Surface-N.W. Roadway	<b>5</b> 37
1-S - Boring #1, Warehouse Loading Dock,	
Surface Below Concrete	1.2
1-0 - Boring #1, Warehouse Loading Dock,	
3.5 ft. Below Concrete	5.7
5-0 - Boring #5, S.W. Inside Warehouse	
#5, 3'4" - 5'4" Below Concrete	1.4

Results in mg/kg

REPORT CONTINUES

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

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SRH Assocates, Inc. Page Two

Attention: John Ruddick

Analysis Requested: Pentachlorophenoi

Sample Location: Time Oil Co., Portland Terminal

SAMPLE IL	RESULTS
5-2 - Boring #5, S.W. Inside Warehouse 5'4" - 7'4" Below Concrete	5.6
5-4 - Boring #5, 5.W. Inside Warehouse 7'4" - 9'4" Below Concrete	< 1
5.7 - Boring #5, 5.W. Inside Warehouse 10'4" - 17'4" Below Concrete	< 1
5.12- Boring #5, 5.W. Inside Warehouse	
15'4" - 17'4" Below Concrete 6-0 - Boring #6, W. Central Inside Warehouse	< 1 < 1
3'5" - 5'5" Below Concrete	<b>\ 1</b>
6-2 - Boring #6, W. Central Inside Warehouse 5'5" - 7'5" Below Concrete	< 1
6-4 - Boring #6, W. Central Inside Warehouse 7'5" - 9'5" Below Concrete	< 1
6-7 - Boring #6, W. Central Inside Warehouse 10'5" - 12'5" Below Concrete	< 1
6-12- Boring #6, W. Central Inside Warehouse 15'5" - 17'5" Below Concrete	0.94
D-2 - Waste Pile @ T-S, Duplicate of T-S	3420

Results in mg/kg

< denotes "less than"</pre>

REPORT CONTINUES

61

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

SRH Assocates, Inc. Page Three

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS
T-S - Waste Pile, Feet Below Top of Pile Q-S - Waste Pile, Feet Below Top of Pile D-1 - Boring #6, Duplicate of G-S	1280 298 < 1
4-0 - Boring #4, S.E. Warehouse 3'5" - 5'5" Below Concrete	< 1
4-2 - Boring #4, S.E. Warehouse 5'5" - 7'5" Below Concrete	< 1
4-4 - Boring #4, S.E. Warehouse 7'5" - 9'5" Below Concrete	< 1
4-7 - Boring #4, S.E. Warehouse 10'5" - 12'5" Below Concrete	0.96
4-12- Boring #4, S.E. Warenouse 15'5" - 17'5" Below Concrete	₹ 1
3-0 - Boring #3, E. Central Warehouse 3'5" - 5'5" Below Concrete	< 1
3-2 - Boring #3, E. Central Warehouse 5'5" - 7'5" Below Concrete	< 1
3-4 - Boring #3, E. Central Warehouse 7'5" - 9'5" Below Concrete	< 1
9-7 - Boring #3, E. Central Warehouse 10'5" - 12'5" Below Concrete	< 1
3-12- Boring #3, E. Central Warehouse 15'5" - 17'5" Below Concrete	< 1

Results in mg/kg

REPORT CONTINUES

61

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.



SRH Assocates, Inc.

Page Four

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS	* Recovery
6-4 - Boring #6, W. Central Inside Warehouse		
7'5" - 9'5" Below Concrete (Duplicate)	< 1	
4-4 - Boring #4, S.E. Warehouse		
7'5" - 9'5" Below Concrete (Duplicate)	< i	
3-12- Boring #3, E. Central Warehouse		
15'5" - 17'5" Below Concrete (Duplicate)	< 1	
6-4 - Boring #6, W. Central Inside Warehouse		
7'5" - 9'5" Below Concrete (Spike)	399	101
4-4 - Boring #4, 5.E. Warehouse		
7'5" - 9'5" Below Concrete (Spike)	373	96

Results in mg/kg

< denotes "less than"

Analysis by soxhlet extraction, capillary GC/FID, EPA Method 8040

Sincerely.

Susan M. Coffey,

President

SMC/gs

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

61

SRH Assocates, Inc. P.O. Box 14005

Portland, Oregon 97214

Attention: John Ruddick

Analysis Requested: Pentachloropnenol

Sample Location: Time Oil Co., Portland

Sample Date: 8/25/86

SAMPLE ID	RESULTS
2-0	< 1.0
2-2	< 1.0
2-4	< 1.0
2-7	< 1.0
2-12	< 1.0
1-2	< 1.0
1-4	< 1.0
1-7	< 1.0
1-12	< 1.0

Results in mg/kg

< denotes "less than"

Analysis by soxhlet extraction, capillary GC/FID, EPA Method 8040

Sincerely,

President

SMC/qs

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.



September 5, 1986 Log # A860829-N P.O. None

SRH Adsociates Incorporated F.O. Box 14005

Portlane, Oregon 97214

Attention: John Ruddick

Subject: Pentachlorophenol and pH Analysis

Sample Type: Snownd Water
Sample Collection Date: August 29, 1986

SAMPLE NAME	PENTACHLOROPHENOL	₽H
MW-D	ბ.04 თდ/∟	6.53 58
MM-E	( 0.01 mg/L	6.54 SU
MW-F	< 0.01 mg/L	6.57 50
MW-H	/ 0.01 mg/L	6.91 SU
MW-I	( 0.01 mg/L	€.77 50

Pentachorophenol analysis by extraction and capillary GC/FID. The symbol " $\langle$ " means less than and denotes none detected at or above the level indicated.

Sincerely,

Susan M. Coffey.

President

SMC:hh

This report for the sole and scalusive use of the above named clent. Samples are held for a maximum of  $\sqrt{2}$  days from the date of this report.





September 9, 1936 Log #A860903-J

SEH Associates, Inc.

P.O. Box 14005

Portland, Oregon 97214

Attention: John Rudaich

Analyses Requested: Fentachlorophenol (PCF) and ph

SAMPLE ID	PCP*	рп
MWA, 9/3/86, 1030	< 0.01 mg/L	6.8 5.0.
MWA, 9/3/26, 1110	< 0.01 mg/L	6.7 5.0.

denotes "less than"

\* Analysis by extraction, capillary GC/FIE. Method 604.

Approved by

SMC/gs

Susan M. Brillante,

Mgr., Organic Laboratories

sisan M. Brillante

Sincerely,

Susan M. Coffey,

Fresident

**6** J

This report is for the sole and exclusive use of the above client, Samples are retained a maximum of 15 days from the date of this letter:



September 18, 1986 Log #A860916-F

SRH Associates, Inc. 7.0. Box 14005

Portland, Oregon 97214

Attention: John Ruddick

Analysis Requested: Pentachionopheno:

SAMPLE ID

RESULTS

------

#20 55

SMC/os

< 0.3 mg/kg

Analysis by extraction, capitiary 00/FID and comparison with solutions of standards.

Asproved by.

. Susan M. Brillante.

Mgr., Organic Laboratories

Sincerely,

Sugar M. Coffe

Fresident

This report is for the spie and exclusive use of the above chient. Samples are retained a maximum of 15 days from the date of this letter.

61



October 1, 1986 Log #A860926-A

SRH Associates, Inc. 123 N.E. Third/Suite 230 P.O. Box 14005 Portland, Oregon 97214

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

SAMPLE ID

RESULTS

V 0 0/55

-----

K-0, 9/25 0915, Soil

1200 mg/kg

Analysis by EPA Method 8040, capillary CC/FID.

Approved by,

Sincerely,

Susan M. Brillante,

Mgr., Organic Laboratories

Susan M. Coffey,

President

SMC/ys

This report is for the sole and exclusive use of the above client, Samples are retained a maximum of 15 days from the date of this letter,

61



AIG3M 2	CHAIN OF CUST	Les (2) 19 (2)	246 / S/2 H 80 406 / S/2 / SA	MEDIA SAMPLE IDENTIFICATION TAINERS	WATELLIAR WITANK FARM 2 HAMIN								Doie / Time Received by: (Separator) Relinquished by: (Separator) Date / Time Received by: (Separator) From)	//om) Date/Time Received by: (Supermis/Firm) Relinquished by: (Supermis/Firm) Date/Time Received by: (Supermis/Firm)	/firm) Date/Time Received by: (Signature/Firm) Date/Time Remarks (attachments if necessary)
VIO3N 5		DCATION OF L.	1200	AIG3M	BAILES								)   Del	/spa) Date/	

					) 		-,	
Recaired by (Steamers/Fire)	Date / Time	/www/	Relinguished by: (50	3/fins) Be			1	4 by: ( Signature) / Pam )
Received by: (Signerary / Pire)	Desis / Tiese	(mg/empe	92) , úg pogspiðu	The same	Soffer L. B.		701   Date / Time	POORING
	1 1					1	+	$\Pi$
								,
			$\prod$		1 1			
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			-	<b>3</b>	E	Rosowar		797
			3		1			C(H)
			1	m N	VR FIBER	50 Tave	1	274 1600
	N. S. S. S. S. S. S. S. S. S. S. S. S. S.			<del></del> `	SAMPLE IDENTIFICATION	SAMPLE 10	SAVT SAVT MEDIA	DATE TIME
P. C. REMARKS (with fallbale)	CW TV38		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5 · · · · · · · · · · · · · · · · · · ·		~	100	28 4 N
(N.SA)	\		BALLEN ON THE PROPERTY OF THE	9	Pox	9	1 0 1 L	3 Time
		,	Y RECORD X	CHAIN OF CUSTODY RECORD	CHAIN		CATION	MOLEVICE AND CALLERY
		Cayo,	(exce)					

			i *	A
	CP (YOUN) SEALINTACTOR (THE IMMORE)	HOLD Strate	*     *	Bate/Time Received by: (Second fries)  8/3-6   1926   22 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	ON TOTS			Nomeric (electments if secon
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LIENT ANALYSIS REQUEST

# COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

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# PROPOSAL AND COST ESTIMATE

BENCH SCALE FEASIBILITY STUDIES FOR THE ELUTION OF PCP FROM CONTAMINATED SOIL

**DECEMBER 19, 1986** 

Prepared for:

TIME OIL COMPANY 2737 WEST COMMODORE WAY SEATTLE, WASHINGTON

Prepared by:

SRH ASSOCIATES, INC. 123 NE THIRD AVE, SUITE 230 PORTLAND, OREGON 97232 (503) 232-0824

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### INTRODUCTION

Time Oil Co. has been investigating the nature and extent of soil and groundwater contamination at its Northwest Terminal facility located in Portland, Or. as a result of pentachlorophenol (PCP) releases which occurred at that site over a period of several years. The results of this investigation indicate that the sandy soils to the south of the wood treating chemicals warehouse are contaminated with PCP at concentrations ranging up to several thousand parts per million.

As a result of these findings, Time has performed a preliminary analysis of potential remedial alternatives for the contaminated soils at the site. Due to existing bans on landfilling of the waste (categorized by EPA as listed hazardous waste number F027) and due to Time's expressed interest in preventing further environmental impairment from this site, few alternatives were concluded to be viable. In October of 1986, SRH Associates conducted a review of all available alternatives for the disposal or treatment of Time's PCP contaminated soil. Since this evaluation, the residual soils from the incineration or thermal treatment of F027 contaminated soils have been upheld as being a separately listed hazardous waste (F028), making such thermal processes unsatisfactory remedial alternatives for Time since the resulting soils could not reasonably be expected to be easily delisted from hazardous status.

On the basis of these cumulative findings, no commercially available, licensed process was identified that was capable of treating or disposing of Time's PCP contaminated soils. Several developmental technologies were identified that appeared to have the capability to achieve Time's objectives but which had not been commercialized or demonstrated under conditions found at the Northwest Terminal facility.

On the basis of Time's evaluation of the available remedial alternatives and the above information, a site specific assessment of soil washing technology was recommended. (See Report "Pentachlorophenol Contamination, Northwest Terminal, Section II, pg. 20) Soil washing involves the extraction of wastes from soils using solvents, surfactants or other solutions. The current status of soil washing technology is generally regarded as developmental, however it represents one of the more advanced technologies available to Time in light of the restrictions placed on landfilling, incineration, and closure of the wastes in place. Assessment of this process is consistent with EPA's Research, Development and Demonstration (RD&D) protocols which ultimately require a demonstration to the agency of the effectiveness and limitations of a waste treatment technology prior to its implementation.

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The Northwest Terminal contamination is of such a nature that some degree of demonstration to the regulatory agencies of any cleanup process can be expected to be required prior to the implementation of cleanup efforts. This requirement can be expected due to existing regulations, the extent of contamination at Northwest Terminal, and the potential for the presence of dioxin in the wastes.

The following is a proposed scope of work and cost estimate for a bench scale evaluation of soil washing protocols for application to Time's PCP contaminated soil. The proposal defines the work necessary to review existing literature and to perform bench scale studies to generate data which confirm or reject the assur ion that soil washing technologies can successfully clean up The's contaminated soils. The proposed scope of work does not, at this time, include pilot scale studies, which ordinarily follow bench scale determinations, since it is misleading to attemnt to define the scope of work or costs associated with the pilot phase of the project until such time as bench scale results define an appropriate process for scale-up considerations.

### SCOPE OF WORK

### OVERVIEW

The complete investigation of the feasibility of using soil washing procedures to remediate soils at Time's Northwest Terminal includes the following tasks:

- o Review of existing literature and regulations.
- o Performance of bench scale experiments.
- o Evaluation of bench scale results and execution of a decision to continue or terminate the investigation.
- o Performance of pilot scale experiments.
- o Determination of the economic feasibility of the projected process and execution of a decision to proceed or terminate the investigation.
- o Engineering and design of process equipment, if not commercially available.
- o Fabrication of unavailable equipment and implementation of the process for EPA demonstration and subsequent cleanup activities.

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This proposal addresses only the first phase of the project which includes the first three tasks. Segmenting the project into rational phases with decision points at which to appraise the value of proceeding following completion of each phase, permits stricter control over the project and allows better estimation of the scope of work and costs involved with each phase. The phases may be described as follows:

- o Bench scale studies
- o Pilot scale studies
- o Engineering and Implementation

The detailed scope of work and cost estimate for the bench scale study phase of this project is presented below.

### BENCH SCALE STUDIES

The bench scale studies are intended to generate sufficient data to allow Time to make an informed decision to proceed with or abandon the project with a minimal amount of capital expended. The tasks associated with this phase are designed to evaluate three different soil washing procedures, to define the parameters associated with their use, to characterize the soil chemistry and the spectrum of contaminants in the PCP contaminated soil at Time's Northwest Terminal facility, to select the most effective soil washing procedure based on bench study results, to define the return of the recovered elutriate solution generated during soil washing, and to assess methods for destruction of the contaminants found in that elutriate. The following is a detailed task breakdown to accomplish these objectives.

### Task 1 - Review Current Regulations

To reduce the risk of new regulations or new interpretations of existing regulations unfavorably impacting this study, SRH will appraise the status of regulations affecting soil washing technology. These evaluations are necessary to prevent the expenditure of time investigating technologies which are generally regarded as unpermittable and to preclude the potential for regulatory violations and fines. Perhaps the most functional purpose of this task is to provide Time with both regulatory and political data to properly prepare submittals to EPA and DEQ in order to expedite acceptance of plans, permits and other communications.

EPA representatives from Region X, Waste Management Branch, Hazardous Waste Division, Seattle; EPA Headquarters, Office of Solid Waste, Washington, D.C.; and the Office of Research and

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1.A.

Development (ORD), Cincinnati, OH., will be queried regarding the current and pending status of regulations regarding PCP treatment technologies. SRH proposes to solicit and evaluate the information received from these agencies in a confidential manner to allow Time Oil Co. access to unbiased information and to develop strategies which are expeditious due to their regulatory and political acceptability. Emphasis will be placed on extraction procedures. Particular effort will be placed on discussions with representatives from the Alternative Treatment Technologies Section of ORD to not only review the regulations associated with extraction of PCP contaminated soils, but to also determine the status of research being performed by EPA in this area.

This task is expected to require 2 weeks for completion with an estimated cost of \$2,336.

# Task 2 - Review Current Extraction Literature

SRH will review existing extraction technology by examining literature in the fields of hazardous waste extraction, food processing technology (specifically edible oils) and metal recovery and mining (ore leaching). In addition to the discussions with ORD described under task 1, EPA's list of internal publications will be reviewed to identify, obtain copies of, and subsequently review EPA literature in this field. General extraction theory will be reviewed using current texts. U.S. patent literature will be reviewed to appraise the status of engineering in this field. Manufacturers of extraction equipment will be contacted to determine the commercial availability of extraction equipment and to allow initial estimates of potential costs.

SRH will present the results of tasks 1 through 3 to Time Oil Company representatives at Time's offices in Seattle as a part of task 2. This meeting will be conducted to review findings and to refine the scope of work relative to the development of the bench scale study plan.

This task is expected to require 2 weeks for completion with an estimated cost of \$4,316.

### Task 3 - Evaluate the Nature of the Wastes to be Treated

SRH will determine the porosity, grain size distribution, organic carbon content and other critical parameters of Time's contaminated soil which affect the extraction of PCP and any other identified contaminants from the soil. Analyses performed to date have indicated the presence of unidentified contaminants



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in addition to PCP in the soil at Northwest Terminal. SRH will determine the presence and nature of contaminants other than PCP in the soil to allow determination of their impact on the extraction process. Samples of soil from the Northwest Terminal PCP site will be taken and evaluated for priority pollutants by GC/MS, ICP and other appropriate analytical techniques with identification of other major peaks as indicated. Specifically, soil will be evaluated for grain size (particle size distribution), soil type, porosity, specific gravity, moisture content, pH, total organic carbon and oil and grease levels. Two samples are proposed for each test to allow for an estimation of the range of concentration of the contaminants found.

This task is expected to require 3 weeks for completion (including 2 weeks for laboratory analyses) with an estimated cost of \$6781.

# Task 4 - Develop an Initial Plan for Bench Scale Studies

The information generated in tasks 1 through 3 will be used to refine the experimental approaches needed to complete bench scale studies. The following proposed plan is expected to undergo modification based on those results.

his investigatory plan is based on extraction theory and the existing literature but is heavily weighted towards existing and available technology and equipment. It is intended to quickly produce sufficient results to allow Time to determine if further pursuit of the project is warranted.

Extractability of soil contaminants will be initially evaluated using simple jar tests. Jar tests will be performed by introducing a known amount of contaminated soil into a beaker containing a fixed volume of extracting solution. The material will be agitated for a fixed period of time at a known temperature. Following this protocol, the filtered solution and the extracted soil will be analyzed for PCP and the extraction ratio determined.

Organic solvents, elevated pH solutions and aqueous solutions of surfactants will be evaluated. Up to four solvents, four different pH levels and four different surfactants will be evaluated. Based on the observed results, relative costs, safety and environmental considerations, two different elutriating solutions will be selected for further evaluation, including optimization of extraction conditions. The effect of the extraction procedure on contaminants other than PCP which have been determined to be present in the soil will be assessed by

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analysis of the extract and the residual soil for these materials. Conditions indicative of a potentially successful soil cleaning process will be pursued for optimization of the batch process. To optimize the process, the extracting conditions will be varied with respect to surfactant concentration, extraction time, temperature and/or pH, as appropriate, to maximize the removal of PCP and other contaminants from the soil. It should be noted that different contaminants may require different extraction solutions (or combinations of solutions). SRH believes that PCP and oil are the principal contaminants and a single extraction solution may be used to remove both substances from Time's soil.

When the batch process has been optimized in the above fashion, samples of the elutriate will be analyzed for all identified contaminants. A description of the elutriate solution will be prepared to allow for evaluation of elutriate treatment alternatives. At this time, it is expected that oxidation or reduction of the waste material represents a potential treatment option but that final selection of a suitable treatment will require a precise understanding of what contaminating materials, other than PCP, may be present.

The optimized solution will be used to compare three extraction procedures, as appropriate, i.e. sequenced batch, countercurrent, and reflux (Soxhlet) extractions. processes can be conducted in SRH's bench scale, laboratory apparatus. The objective of this set of tests is to optimize the extraction procedure by improving efficiency and minimizing the quantities of solution required. This study will necessarily be contingent upon the extraction For example, selected. since caustic and surfactant solutions are not generally volatile, Soxhlet procedures would not be applicable to these solutions and therefore would not be evaluated. Conversely, if an organic solvent is indicated as the elutriating solution, it may be necessary to remove the residual solvent from the extracted soil prior to discharge from the extractor. In this case, sequenced batch extraction may be favored while continuous processes such as countercurrent or soxhlet extraction would be contraindicated.

The last evaluation in the bench scale phase of the project is the determination of a treatment method for the extracted material. Although this evaluation will ultimately depend on the nature of the material as produced, it is believed that oxidation/reduction or separatory methods represent likely candidates. For example, if the extraction is performed using caustic solutions, acidification of the extract to a pH < 5.0 may precipitate significant amounts of

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PCP due to the reduced solubility of this compound in its acid form. Conversely, if large amounts of oil are present, it may be necessary to utilize a solvent as the extractant, in which case removal of the solvent and treatment of the residual material through peroxide, permanganate, or other chemical oxidation process, chemical reduction, or physical adsorption onto organic or inorganic substrates may be preferred.

The plan will be developed in close association with Time Oil Co. personnel to ensure that the resultant plan meets Time's expectations and requirements.

This task is expected to require 1 week for completion, with an estimated cost of \$2290.

#### Task 5 - Implement Bench Scale Study Plan

SRH will conduct the implementation of the study as planned in task 4, above. The plan, which will have been developed in close coordination with Time Oil Company, will have the following components for the sake of discussion and cost estimation:

- o perform 12 initial jar tests
- o analyze 24 PCP samples from initial jar tests
- o perform 6 secondary jar tests
- o analyze 12 PCP samples from secondary jar tests
- o perform 4 jar tests for optimization
- o analyze 8 PCP samples from optimization jar tests
- o perform 3 process emulating extractions (i.e. soxhlet, countercurrent, etc)
- o analyze 6 PCP samples from process emulating extractions
- o analyze optimized extract from optimized jar test for all identified contaminants
- o perform 4 separatory tests on optimized extract
- o perform 3 oxidation tests on optimized extract
- o perform 2 reduction tests on optimized extract
- o analyze effluent from the above extract destruction tests (9 PCP analyses)
- o analyze 1 effluent sample for all identified contaminants

The results of the bench scale study will be a summary report to Time Oil Co. indicating the success or failure of the soil washing process at the bench scale level and projecting the probability for success of a pilot level scale-up.

SRH has evaluated the topic of PCP extraction from soil and is aware that extensive work has already been performed in assessing

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the extraction efficiency of this material from soils in an EPA directed extraction procedure for preparing samples for quantitative analysis. This work, done to provide a means for analyzing contaminated soil, has direct bearing on this project, and leads SRH to conclude that reflux extractions may pose a viable and well documented process for PCP contaminated soil remediation. To date, SRH is unaware of any commercial effort to decontaminate soils by this process.

This task is expected to require approximately 12 weeks for completion, including laboratory turn around time. The estimate cost for this task is \$23,680, including analytical costs.

#### Task 6 - Prepare Report and Submit Recommendations

SRH will prepare a summary report presenting the data, conclusions and its recommendations to Time Oil Company. The report will include copies of experimental protocols and analytical results and will present a summary of the results and their significance to allow Time Oil Company to determine if further pursuit of this project is warranted. SRH will also attend a one day meeting at Time's offices in Seattle to review the results and conclusions with Time's representatives.

This task is expected to require 1 week for completion with an estimated cost of \$2,626.

#### COST ESTIMATE

Although the precise determination of the costs associated with any developmental process is difficult due to the large potential for project reorientation based on new results and findings, SRH believes that the following cost estimates provide a good foundation for project assessment. SRH proposes to perform the work on a time and materials basis according to its current rate schedule. The estimated costs presented herein would not be exceeded without prior authorization from Time.

A detailed cost estimate breakdown is presented in figure 1. SRH suggests that the estimate be reviewed following the completion of tasks 1 - 3, to reflect information obtained during these activities which could impact the assumptions made in estimated tasks 4 through 6. SRH estimates the total bench scale phase costs to be \$37,868 including labor and expenses.

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TABLE 1 - COST ESTIMATE DETAIL

TASK	PERSONNEL	HOURS	COST
TASK 1 - REVIEW CUR	RENT REGULATION	1S	
LABOR	REG. SPEC. CLER	24.0 8.0	\$1,920.00 \$216.00
	TOTAL	32.0	\$2,136.00
EXPENSES	MISC.		\$200.00
	TOTAL		\$200.00
TOTAL			\$2,336.00
TASK 2 - REVIEW CUR		N LITERATU	RE
TASK 2A - REVIEW LI	TERATURE		
LABOR	SR. SCI CLER CHEM	32.0 8.0 10.0	\$2,560.00 \$216.00 \$500.00
	TOTAL	50.0	\$3,276.00
EXPENSES	MISC.		\$200.00
	TOTAL		\$200.00
TOTAL			\$3,476.00
TASK 2B - MEETING W	VITH TIME OIL CO	0	
LABOR	PRIN	8.0	\$640.00
	TOTAL	8.0	\$640.00
EXPENSES	MISC.		\$200.00
	TOTAL		\$200.00
TOTAL			\$840.00

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			TOTAL TASK	2		\$4,316.00
TASK	3	_	EVALUATE N	ATURE OF WASTES		
			LABOR	SR. SCI CLER CHEM GEOL	16.0 8.0 8.0 8.0	\$1,280.00 \$216.00 \$400.00 \$480.00
				TOTAL	40.0	\$2,376.00
			EXPENSES	MISC. ANALYTICAL TOTAL		\$300.00 \$4,105.50 \$4,405.50
			TOTAL			\$6,781.50
TASK	4	-	DEVELOP ST	JDY PLAN		
			LABOR	SR. SCI CLER	24.0 10.0	\$1,920.00 \$270.00
				TOTAL	34.0	\$2,190.00
			EXPENSES	MISC.		\$100.00
				TOTAL		\$100.00
			TOTAL			\$2,290.00
TASK	5	-	IMPLEMENT	BENCH SCALE STUDY	!	
			LABOR	SR. SCI CLER CHEM GEOL TECH	40.0 16.0 72.0 24.0 40.0	\$3,200.00 \$432.00 \$3,600.00 \$1,440.00 \$1,600.00
				TOTAL	192.0	\$10,272.00
			EXPENSES	MISC. ANALYTICAL COMPUTER OTHER LABORATORY	t.	\$350.00 \$9,487.50 \$150.00 \$3,421.25
				TOTAL		\$13,408.75
			TOTAL			\$23,680.75

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#### TASK 6 - REPORT AND RECOMMENDATIONS

TASK 6A - PREPARE REPORT

	LABOR	SR. SCI ADMIN CHEM CLER	8.0 8.0 5.0 8.0	\$640.00 \$480.00 \$250.00 \$216.00
		TOTAL	29.0	\$1,586.00
	EXPENSES	MISC.		\$200.00
		TOTAL		\$200.00
	TOTAL			\$1,786.00
TASK 6B	- MEETING W	TH TIME OIL CO		
	LABOR	PRIN	8.0	\$640.00
		TOTAL	8.0	\$640.00
	EXPENSES	MISC.		\$200.00
		TOTAL		\$200.00
	TOTAL			\$840.00
	TOTAL TASK	6		\$2,626.00

NOTES:

PROJECT TOTAL

REG. SPEC REGULATORY SPECIALIST
CLER CLERICAL
SR. SCI SENIOR SCIENTIST
CHEM CHEMIST
PRIN PRINCIPAL
ADMIN ADMINISTRATIVE ASSISTANT
GEOL GEOLOGIST

\$42,030.25

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TIME OIL CO.

INVOICE REFERENCE NO. AMOUNT INVOICE REFERENCE NO. AMOUNT

CHECK DATE 1/2-/ DISCOUNT
CHECK NO. 17:55 TOTAL

WHEN DETACHED AND PAID, THIS CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE ITEMIZED ACCOUNT

IME :	TIME OIL	CO.		Citibank € A subsidiery of Citico	176587 Delaware 62-20 311
PAY TO TH ORDER OF	IE.	MINAL STATION SEATTLE, W		TECTED AMOUNT	01/25/37 AMOUNT
CENTU P.O. EEND	ORY WEST EN BOX 1174 OR 97701	GINEERING	By		6 MONTHS  IEGOTIABLE  JARS REQUIRED



### INVOICE FOR PROFESSIONAL SERVICES

Time Oil Co. P.O. Box 24447 2737 W Commadore Way Seattle, WA 98124

ATTN: John Denham

DESCRIPTION:

Project No.: 6002400101

Well Sampling and Analysis

INVOICE BILLING AMOUNTS:

Work Completed for March 1986

Professional Services

\$130.50

TOTAL AMOUNT DUE TRIS INVOICE

S130.50

CO DIV THE RECEIVED JAN 2.1 1988

RECEIVED JAN 2.1 1988

PLANNERS \* ENGINEERS \* ECONOMISTS \* SCIENTISTS ATTACHED SIGN

POST OFFICE BOX 1174 \* BEND, OREGON 97701 \* TELEPHONE (503) 388-3500

Original for your records. Please return duplicate with remittance.



#### Interoffice Correspondence

To

W.J. Baldwin

From

M.J. Dvorsky

Location

K-1350

Location

K-1940

Subject

Time Oil - 460100

Date

February 6, 1987

The correspondence dated January 14, 1987, on the Time Oil Company has been forwarded for review to the Environmental Engineering Group of Keystone as par your request of February 3, 1937. We have set up project number 460100 under the Protection Products section of the Building Products Sector to track costs of this review.

In a quick review of the information, nothing is said of how the effluent streams from the various process streams would be rendered non-toxic. Dilution below toxic levels and discharge to a POTW may not be acceptable to the regulatory authorities. Should the liquid stream be passed through activated charcoal, what is to be done with the spent charcoal? It cannot be classified K001.

These are a few preliminary comments. Once all the reviews, both technical and regulatorial, have been accomplished, a meeting will be scheduled to discuss our comments with you.

Mike

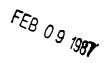
MD/snig

cc: J. Sebbens

J. Smith

J. Fu





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These are a few preliminary comments. Once all the reviews, both technical and regulatorial, have been accomplished, a meeting will be scheduled to discuss our comments with you.

Mike

MD/smg

cc: J. Sebbens

J. Smith

J. Fu

JACK ADIM 5901 dirt

soil work
HRC do - out analytical only

TOLS010389

K-64

00059



March 5, 1987

Mr. John Denham Time Oil Co. 2737 W. Commodore Way Seattle, WA 98119

Dear Mr. Denham:

Thank you for your recent inquiry into Shirco Infrared Systems, Inc.

Enclosed please find the informational material which you requested. If we may be of further assistance, please contact Mr. Jim Fowler, Sales Vice President.

Thank you for your interest in our company.

Sincerely,

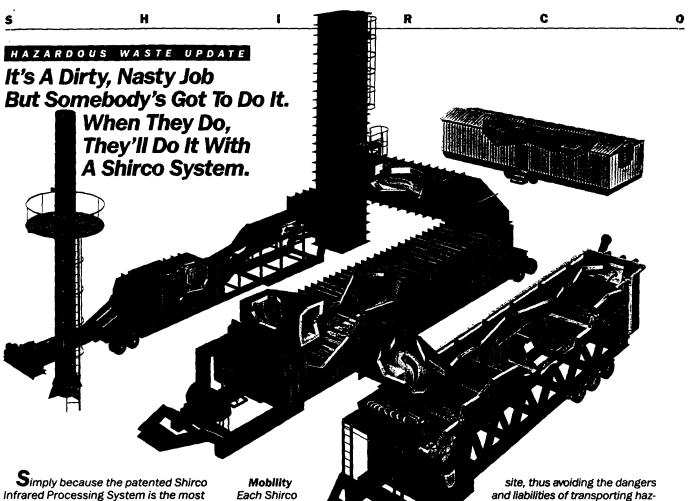
Molly K. Boyd

Marketing Coordinator

Enclosure

cc: J. Fowler

1195 Empire Central Dallas, Texas 75247-4301 (214) 630-7511



effective waste disposal technology in the industry - it's mobile - it's proven it's cost efficient. Technology The Shirco mobile system

will process from 100 to 250 tons of hazardous waste per day, depending on waste characteristics.

The system is comprised of four components: an electric powered infrared primary furnace capable of temperatures up to 1850°F; an infrared or gas fired secondary furnace reaching temperatures of 2300°F; an emissions control system and a process management and monitoring center.

The heart of the system is within the primary furnace. Here the waste is precisely metered onto a woven wire mesh belt that transports it through atmospheric controlled heating modules. The temperature controlled modules are lined with layers of lightweight ceramic fiber blanket insulation. The waste is exposed to heat provided by rows of electric powered infrared silicon carbide rods.

Combined, these features give the Shirco system the highest degree of process control and superior treatment performance.

Each Shirco component is mounted on wheels

and can be trucked to any location accessible by road. Once on site, a crew of nine men can connect the components and begin processing waste in as few as seven days. Upon completion, the entire system can be dismantled and mobilized to go to the next site within a week.

This mobility allows service contractors to treat the problem where it exists -- on

> Shirco Infrared Systems

1195 Empire Central Dallas, Texas 75247-4301 (214) 630-7511



and liabilities of transporting hazardous wastes to landfills and treatment centers

Proven Capability Various applications of the Shirco system have been used successfully at permanent sites throughout the world since 1976.

Shirco's portable infrared processing system has been tested at several RCRA and Superfund sites across the country. The system has been proven successful on a wide range of hazardous wastes including dioxins and PCB's. In every instance, air emissions have been substantially below EPA standards, and the treated waste residuals have been rendered nonhazardous and safe for on site disposal.

Cost Efficiency The Shirco infrared system's low capital cost, processing efficiencies, high production capacities and on site operation result in lower operating costs than other incineration alternatives. So much lower that now, with the use of a Shirco mobile system, total on site hazardous waste cleanup can be done at a cost lower than disposal at an off site landfill.

So, if you have a dirty nasty job, call somebody with a Shirco mobile system. Because you can't bury your waste and make the problems go away.

ination Cacominando la 2000 por montre Grimmer of Water-Tech. to Robert 2/43". mines In. WASTE-TECH SERVICES, INC. George P. Rasmussen, P.E. 18400 W. 10th Ave. Golden, CO 80401 Vice President, Engineering (303) 279-9712

Damp, loose sand 94 16/CF > 1.3 Ton/cy

1.3 Ton x 1550 cg = 2015 Tons

Shirco Infared Systems

Potential incinerator for perta soil at NW Termind

1550 cuyd (2015 Tms) at average 1851 per concentration

George Rasmussen [VP Enginery Waste-Tech Services, Inc.

Golden CO (303) 279-9212] recommended system

to Robert A. on 2/4/87

Jim Fowler of Shirco (214) 630-7511

Y/2/87 - will send info on 25.7m unit (available in October). Consists of 1 trailer & 1 instrument van.

Can process 40 Ton/day. Costs >360/Ton

Shirco only manufactures unit - two companies in Seattle are considering purchase

> Chem Processing (Roger Nelson) will put him in touch with us - knows system best

Aso Nell Enviro Service

Forder will be in seattle last work in April - will call us.

\* 2015 + 8 × 350/T = 705,250 includes mob/Demos 2015 7 6 40 T/Day = 50 days





# TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

April 17, 1987

227-2000

227-27-

Koppers Company Inc. Attn: Jay Sebbins

Koppers Building, Room 750 ≉ Pittsburgh, PA 15219 2

Dear Mr. Sebbins:

This refers to our previous telecon regarding clean-up of Koppers owned pentachlorophenol at 12005 North Burgard, Portland, OR and Time Oil invoice 091868 dated 03/06/86, which you agreed to look into and give me a call back ` regarding payment.

To my knowledge, there has been no call hence this letter as a reminder. Since invoice 091868 was forwarded, those items shown on invoice as "COMMITMENTS" became a reality and have been paid by Time Oil. In addition, other essentials have been accomplished and fees for those services have been also paid by Time. The net result is an increase to Koppers share of costs by \$12,699.07.

Enclosed is copy of original invoice, a listing of expenditures to date and an invoice for one-half the cost of those expenditures incurred since original invoice. This package reflects total costs as of 04/01/87.

Your processing of these invoices for prompt payment is truly appreciated.

7/7/27

Him Selling gave it to

Bill Baldwin & he ( wolmen took mark

JPO/jam

the DITT Create it see! & pas Ino ne

Cace m

TOLS010394

Sincerely,

John P. Denham

Environmental Manager





# TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

October 2, 1987

Keystone Environmental Resources Inc. Jim Campbell 436 7th Ave. Pittsburg, PA 15219

Dear Mr. Campbell:

This is in reference to our discussion regarding clean up costs at 12005 North Burgard in Portland, Oregon.

Enclosed are copies of the documents you wish to review.

- A. The Original invoice #091868 dated March 6, 1986 for \$42,081.21.
- B. A complete list of expenditures as of April 1, 1987.
- C. Billing for the additional charges of \$12,699.07 for expenses after the date of the original invoice.

Your cost for half the expenditure, per mutual agreement is \$54,780.28.

We appreciate your working with us and look forward to hearing from you at your earliest convenience.

Yours Truly,

TIME OIL CO.

Som fuch

Credit Manager

JEL: 1td

Enclosures

Bcc: Robert Abendroth -

John Denham

Mr. Campbell acknowledged that the obligation must be taken care of. He wants to go over it with

their attorney & hinted at a "settlement"

0002B



October 26, 1987

Billie Nolan Koppers Company, Inc. Legal Services 436 Seventh Avenue Pittsburgh, PA 15219

RE: Wauna, Oregon

Hazardous Waste Site

Dear Billie:

When we last spoke on September 2, my notes indicate you were to give me a letter after your Mr. Campbell had talked with our technical person, Mr. Crews. That discussion has taken place and I look forward to your letter.

Yours very truly,

Counsel

RWS: pw

cc: W.B. Crews - CES, Camas

CC J. Campbell - Let's dessure.
11-4-87 Bun 1/3

1060j





# TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

Petia 1.2

October 2, 1987

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TIME OIL CO.

John E. Luckovich Credit Manager

JEL:1td

**Enclosures** 

Bcc: Robert Abendroth
John Denham

Mr. Campbell acknowledged that the obligation must be taken care of. He wants to go over it with their attorney & hinted at a "settlement"

0002B

#### IN ACCOUNT WITH:

KOPPERS COMPANY INC. ATTN: JAY SEBBINS KOPPERS BUILDING, ROOM 750 PITTSBURGH, PA 15219

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING EXPENDITURES PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD, PORTLAND, OR:

		•
04/26/85	Chem-Security Systems (Laboratory analysis of soil sample)	\$ 150.00
07/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	\$ 9,000.00
07/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	\$ 27,270.88
08/08/85	Environmental Emergency Services (Sampling and analysis)	\$ 500.00
12/05/85	Environmental Emergency Services (Well drilling, sampling & analysis)	\$ 18,741.55
03/24/86	Environmental Emergency Services (Sandblast and demolish wall; install wells)	\$ 17,252.67
05/16/86	Instrumentation Northwest (Monitoring well materials)	\$ 3,702.66
06/11/86	Century West Engineering (Develop and sample wells)	\$ 2,739.50
06/11/86	Department of Environmental Quality (Per OAR 240-102-065)	\$ 3,500.00
07/08/86	Century Environmental Sciences (sampling wells)	\$ 1,800.00
08/08/86	Riedel Environmental Services, Inc. (Sampling and analysis)	\$ 4,452.81
08/25/86	Jack Eatch Construction Co. (Relocate soil and dispose of concrete wall)	\$ 1,465.00
09/10/86	Concrete Coring Co. (Cut holes through concrete floor of warehouse)	\$ 390.00
10/24/86	SRH Associates, Inc. Investigation of pentachlorophenol as per contract dated 08/14/86	\$ 18,465.00
01/26/87	Century West Engineering (Well sampling and analysis)	\$ 130.50 \$109,560.57
	50% =	\$ 54,780.28
	INVOICE TOTAL	<u>\$ 54,780.28</u>

### SUMMARY OF EXPENSES FOR NW WOODTREATING PROJECT

11/09/87

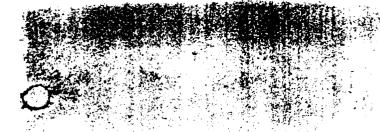
CONTRACTOR	1985 TO DATE	
Riedel - Sampling and Clean-up Chem-Security - Soil Disposal	40,947.03 27,420.88	36.78% 24.63%
★ SRH (& Century) - Sample & Evaluate	2 24,913.31	22.38%
NW Vacuum Truck - Soil Removal	9,000.00	8.08%
Instrumentation NW - Well Materials	3,702.66	3.33%
OR DEQ - Haz Waste Disposal Fee	3,500.00	3.14%
Jack Eatch - Relocate Soil	3 1,465.00	1.32%
Concrete Coring - Whse. Samples	390.00	0.35%
GRAND TOTAL	111,338.88	



#### We can handle it.

1/58

TERRY: PER OUR TEL/CON OF 5/26. ATTACHED IS A COPY OF THE "KOPPERS/MONSANTO"
PRODUCT DATA BOOK IF FURTHER INFO. IS NEEDED DON'T HESITATE TO CALL.



Wood Treating Chemicals Dept. 5137 Southwest Ave. St. Louis, Mo. 63110

(314) 772-2200

KOPPERS.



Return Postage Guaranteed

Time Oil Company

Portland, Oregon 79203





Specialty Wood Chemicals Group **Forest Products Division** Koppers Company, Inc. 5137 Southwest Avenue St. Louis, Missouri 63110 Telephone: 314—772-2200

Product Description 5. Woodtox Pre-Prime Ready-to-Use is a liquid water repellent chemical. This water repellent wood preservative has been specially formulated for treatment of millwork prior to factory or field priming. Woodtox Pre-Prime Ready-to-Use meets National Woodwork Manufacturers Association (NWMA) standards.

Physical Description | Clear, light amber colored solution.

Penta Content 5.2% by weight technical pentachlorophenol meeting Federal Specification ·TT-W-570. Contains minimum of 154 gm of penta/gallon as determined by AWPA A-5, Section 5 method.

Flash Point Minimum 100°F. (Tag Closed Cup) (Typical).

**Dilution Data** 

DO NOT DILUTE. This is a 5% Ready-to-Use solution.

Swellometer Efficiency

Meets or exceeds NWMA Swellometer test of 60% minimum.

Paintability |

Woodtox Pre-Prime has been specially formulated for maximum compatibility with paint primer and finish coatings applied at the factory. The mineral spirits carrier may be "trapped" when sash parts are bulk stacked or bundled too tightly and dip treated; doors or plywood flat stacked is another problem. However, where there is free air circulation to volatize the light solvent from the wood surfaces, Woodtox Pre-Prime open tank treated millwork, lumber or plywood can usually be finished within 24-60 hours after treatment.

Corrosion

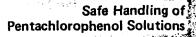
Contains corrosion inhibitor to aid in the prevention of color formation in shipping containers or storage tanks, and to minimize corrosion and/or discoloration of metal fasteners.

Storage Precautions

None, other than to keep out water. Stable over the normal range of storage conditions.

Ready-to-Use ?

Uses of WOODTOX PRE-PRIME ... Woodtox Pre-Prime is used for the treatment of sash and other millwork to meet the Seal of Approval program of the NWMA for a preservative water repellent (IS-4). It is also useful for the treatment of other wood products where the benefits of a preservative and water repellent solution are desired that will help control stain, decay (rot), termites, and other wood boring insects; that will not cause grain raising, and that will leave the wood paintable.



Safe Handling of See Koppers Company, Inc., Wood Treating Chemicals Dept. Bulletin - Pentachlorophenol Solutions "Safety Measures & Precautions for Handling Solutions Containing Pentachlorophenol". Do not use this product indoors.

truck transports. Also available in 5 gallon and 55 gallon drums.

Shipping Classification \$\frac{\pi}{2}\$

Chlorinated phenol petroleum solution - Wood Preservative Liquid, Not Exceeding 5% of chlorinated phenol by weight.

Shipping Points

Product Points and St. Louis, Missouri Warehouse Portland, Oregon

Koppers Company, Inc. Pittsburgh, Pa. 15219 Chemicals and Coatings

experience, represents our best judgment in the matter, and is intended to be helpful. But we cannot assume responsibility for any loss or accident that may result from its use.

Woodtox is a registered trademark of Koppers Company, Inc.

**WOL-15** 

October, 1976

TOLS010404

Litho in U.S.A.

# Woodtox® 140 Concentrate Water Repellent Pentachlorophenol **Preservative**



Specialty Wood Chemicals Group **Forest Products Division** Koppers Company, Inc. 5137 Southwest Avenue St. Louis, Missouri 63110 Telephone: 314--772-2200

**Product Description** 

Woodtox 140 — Concentrate is a water repellent pentachlorophenol

preservative.

**Physical Description** 

Clear — Reddish-Amber colored solution.

Penta Content

22.0% by weight Technical Pentachlorophenol meeting Federal Spec.

TT-W-570.

Specific Gravity

.959 at 15.5°C (60°F.) (Typical)

Weight per Gallon

7.99 lbs. at 15.5°C (60°F.) (Typical)

**Pour Point** 

 $-1^{\circ}$ C (30°F.)

Flash Point 43°C (110°F.) (Typical)

Dilution Data

Before using, dilute at the ratio of one part this product to four parts by volume of a mineral spirits, naphtha, or equivalent solvent weighing not more than 6.46 lbs/gal. to make a ready-to-use solution containing not less than 5.2% Technical Pentachlorophenol by weight. The diluent should have an end point no greater than 360°F. for quick drying and paintability. Agitate thoroughly before using.

It is recommended that the solvent used should be L.A. Rule 66 exempt.

Swellometer Efficiency

Woodtox 140 Concentrate when diluted at the rate of one to four as suggested above and with a suitable mineral spirits will exceed swellometer efficiency of 60%.

Storage Precautions 🛦 As Woodtox 140 Concentrate is made with technical grade materials, upon long standing some sedimentation may occur. This sedimentation is relatively insignificant on a weight basis and does not reduce the efficiency of the product after dilution. This concentrate increases in viscosity when exposed to low temperatures, but returns to normal fluidity if stored or used at ordinary room temperatures.

Use Data This concentration is to be used for the preparation of a ready-to-use solution which conforms to NWMA IS-4 and Federal Specification TT-W-572B when diluted according to label directions.

Safe Handling of For additional information see: "Safety Measures & Precautions for Pentachlorophenol." Handling Solutions Containing Pentachlorophenol".

Packaging \$55 gallon drums, 5 gallon drums and tank cars.

Shipping Classification Wood Preservative, NOI LIQUID OR PASTE

Production Point St. Louis, Missouri Portland, Oregon

Shipping Point St. Louis, Missouri Portland, Oregon

Koppers Company, Inc.
Pittsburgh, Pa. 15219

KOPPERS
Chemicals and Coatings

The information given herein is based on our experience, represents our best judgment in the matter, and is intended to be helpful. But we cannot assume responsibility for any loss or accident that may result from its use.

Woodtox is a registered trademark of Koppers Company, Inc.

WOL-14 October, 1976

TOLS010406

Litho in U.S.A.

5137 Southwest Avenue /2St Louis, Missouri 63110 / 314 P.R 2-2200

### Sheet No. 125 .... March 15, 1967

### PRODUCT INFORMATION DATA

WR CONCENTRATE 340

Trade Name

Wood Treating Name

A STATE OF THE STATE OF

Chemical Name

Programme and the second

Description

Penta Content

Specific Gravity

Weight per Gallon

Pour Point

Flash Point

Mixing Data

Water Repellent Concentrate

WR CONCENTRATE 340

Same as Trade Name

Straw colored liquid containing the proper blend of water repellents and co-solvents so that when blended with Monsanto Penta and with mineral spirits, meeting specifications indicated below, a non-blooming, paintable preservative water repellent solution will result which will meet the requirements of Federal Specification TT-W-572 and AWPI Standard LP-3.

None

0.889 at 15.5° C. (60° F.) (typical)

7.49 pounds at 15.5° C. (60° F.) (typical)

65° F. (approximate for homogeneity)

105° F. minimum - Tag. Closed Cup

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The state of the s

The following mixing instructions are given in units of 405 lbs. of WR CONCENTRATE 340 as that is the weight of the concentrate packed in 55-gallon drums:

WR CONCENTRATE 340

Monsanto Technical Penta

Mineral Spirits (500 Gals.)

405 pounds
200 pounds
3241 pounds

This will yield 566 gallons of water repellent solution containing 5% by weight of Pentachlorophenol if the Mineral Spirits has a weight of 6.5 lbs. per gallon which is typical. Weight of treating solution will be approximately 6.80 pounds per gallon. The volume yield will vary with the weight of the Mineral Spirits or equivalent light petroleum solvent used.

See Wood Treating Chemicals Company Bulletin 1108 and 1513

TOLS010407

THE INFORMATION GIVEN HEREIN IS BASED ON OUR EXPENSIONS REPRESENTS OUR REST, UDGHEST IN THE MATTER AND INTERDED TO BE HELPFUL BUT WE GARRED ASSUME RESPONSIBLELY FOR ANY 188 BR SEE BERT THAT HAT RESULT FIRM IT HERE.

Dilution Data Vising the foregoing formula as an example, and using a fuel oil weighing (Continued) § 7.0 pounds per gallon, to make a 5.2% ready-to-use solution would require:

$$\frac{40.5 - 5.2}{5.2} \times \frac{9.32}{7.0} = 9.04$$
 gallons of oil

Timbertox 40 penta wood preservative concentrate is made with technical grade materials; therefore, when this concentrate is diluted with certain low aromatic petroleum products, a slight sedimentation in the finished solution may appear. This sedimentation is relatively insignificant on a weight basis, and if it is detrimental it can be removed by filtration or by settling for 48 hours and drawing it off the bottom of the container.

Follow detailed instructions on the label for the use of Timbertox 40 Uses penta wood preservative concentrate in wood preservation, and termite control.

Timbertox 40 penta wood preservative concentrate has a very good low temperature stability. Its viscosity increases as the temperature decreases, and it finally becomes so viscous that it will not pour. Upon return to room temperature it again becomes fluid. If it is known that it has been chilled to, or near, the solidification point, it is always good practice to agitate the container (roll the drums) to insure uniformity of product each time before any product is withdrawn from the container.

For additional information please see Koppers bulletin titled "Safety Measures and Precautions for Handling Solutions Containing Pentachlorophenol".

Packaging 55 gallon drums and bulk shipment in tank trucks.

**Shipping Classification** Wood Preservative NOI Liquid or Paste

**Production and Shipping** Portland, Oregon Point

Storage

Safe Handling

Koppers Company, Inc. Pittsburgh, Pa. 15219 Chemicals and Coatings

The information given herein is based on our experience, represents our best judgment in the matter, and is intended to be helpful. But we cannot assume responsibility for any loss or accident that may result from its use.

WOL-22 January, 1977 1M

Litho in U.S.A.



### **MATERIAL SAFETY DATA SHEET**

Chemicals and Coatings

TE OF PREP. 75,5/77 R2 April 1981

wed by U.S. Department of Labor "Essentially Similar" to Form LSB-(
WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, KOPPERS COMPANY MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.



Specialty Wood Chemicals

# Section I — PRODUCT IDENTIFICATION

NUPACTURER'S NAME

ppers Company, Inc., Wood Treating Chemicals Department

314-772-2200

37 Southwest Avenue

Louis, Missouri 63110

NUFACTURER'S CODE IDENTIFICATION

A Reg. No. 453-271, FPL 2304

od Preservative (Water Repellent)

TRADE NAME

Woodtox 140T - Ready to Use

REDIENT	CAS	PERCENT	OSHA TLV		REMARKS
	Registry Number		PPM " mg/M <sup>3</sup>		
neral Spirits*	80 30- 30-6	80	500	2900	**
ntachlorophenol	87-86-5	5		0.5	"Skin" Notation
*Synonym - Stoddard	Solvent			**ACGIH 1	980 TLV = 100 ppm

	Section III — P	HYSICAL DAT	
CING RANGE	300 to 700°F	FREEZING POINT	<- 10°F
CENT VOLATILE	80%	VAPOR PRESSURE AT 20° C	Mineral Spirits 2mm Pentachlorophenol < 1mm
CIFIC GRAVITY	0.837	EVAPORATION RATE (BUTYL AGETATE = 1)	Slower than ether
OR DENSITY	Heavier than air	SOLUBLE IN WATER - % WT.	Negligible
FARANCE			

EARANGE	Amhow-	1n+	-4
ODOR	Winner;	solvent	odor

Section IV — FIRE	AND EXPLOSION HAZAF	RD DATA	
SH POINT (METHOD USED)	FLAMMABLE LIMITS	Lei	Uel
4°F PMCC Mineral Spirits	Mineral_Spirits	0.7	6.0

e National Fire Protection Association (NFPA) classifies burning liquids as Class B fires erefore, any Class B Fire Extinguisher or Extinguishing Agent may be used for fire

ghting purposes.

SUAL FIRE AND EXPLOSION HAZARDS

ter may be used to cool containers. Keep containers tightly closed. Isolate from heat, ectrical equipment, sparks and open flame. Closed containers may explode when exposed to treme heat. Application to hot surfaces requires special precautions. During emergency nditions, overexposure to decomposition products may cause a health hazard. Symptoms may to be immediately apparent. Obtain medical attention.

HAL FIRE FIGHTING PROCEDURES

ll protective equipment including NIOSH/MSHA approved self-contained breathing apparatus uld be used. Water spray may be ineffective. If water is used, fog nozzles are preferable.

ter may be used to cool closed containers to prevent pressure buildup and possible coignition or explosion when exposed to extreme heat. DOT Classification -Liquid

# **MATERIAL SAFETY DATA SHEET**

Market State	Sect	tion V — HEALTH HAZARD DATA	
e Section II.		provided the second of the sec	
y be irritating	to the eyes,	skin or respiratory tract. Ingestion or inhalation of concen-	
ated vapors or	prolonged or r	repeated skin contact may lead to headache, weakness, dizziness	
usea, coordinat	ion loss, prof	fuse sweating, convulsions, & could be fatal. The penta-	_
·		s a metabolic stimulant, causes hyperthermia.	
	skin contact,	, immediately flush with plenty of water for at least 15 minute	s
ile removing confore reuse. Disc	ntaminated clo	othing & shoes. Call a physician. Wash contaminated clothing ated shoes as a waste product (see Section VII). Inhalation:	
move to fresh a gestion: DO NO	ir & call a ph Finduce vomit	ated shoes as a waste product (see Section VII). Inhalation: nysician; apply artificial respiration if necessary. ting. Call a physician immediately.	
	Se	ection VI — REACTIVITY DATA	
ABILITY . UNS	TABLE	S TO AVOID	
eck One) X STAI	11		
idizing agents.	·		
y produce carbon		arbon dioxide, and/or hydrochloric acid by thermal	
composition.			
ZARDOUS LYMERIZATION	MAY OCCUR	CONDITIONS TO AVOID	
eck One)	WILL NOT OCCUR	TOLS010410 -	$\neg$
	Section \	VII - SPILL OR LEAK PROCEDURES	
MOVE SOURCES OF	ignition (fla	AME, hot surfaces, & electrical, static or frictional sparks).	٦
nfine area of sp	oill. Avoid bro	reathing vapors. Ventilate area. Cover with absorbent material	
ch as Speedi-Dry	/* processed c	clay or sand. Place in approved containers for disposal using	1
n-sparking tools	· · · · · · · · · · · · · · · · · · ·	*Sold by Minerals & Chemical Co., Edison, New Jersey	
sposal must be o	carried out in	accordance with Local, State & Federal Regulations, Dispose	7
		mitted chemical landfill or incinerate at a permitted facility.	
not incinerate	closed contain	ners.	٦
·S	ection VIII -	- SPECIAL PROTECTION INFORMATION	
SHA 1910.134 if	ventilation is	appropriate NIOSH/MSHA approved respirator to comply with	٦
	control vapor	Sufficient ventilation in volume & pattern be provided to concentrations below the LEL & TLV in Section II.	٦
NTILATION	MECHANICAL (general	other Remove heavy solvent vapors from supplement local exhaust. lower levels of work areas.	Ī
TECTIVE GLOVES	vious gloves	Safety eyewear, including splash guards.	7
nd/or skin conta	ect is possible	cessible eye bath & safety shower. If clothing contamination le, wear adequate resistant protective clothing.	ᅦ
		ion IX — SPECIAL PRECAUTIONS	
cautions to be taken ombustible liqui	IN HANDLING AND STO		r
		away from high-temperature areas, sparks, fire or open flame.	7
e OSHA 1910.106	for storage	compliance. Do not atomize.	٦
) NOT TAKE INTER	NALLY OR GET	IN EYES. Avoid prolonged and/or repeated breathing of mist,	٦
apors or substan	tially saturat	ated atmosphere. Avoid contact with skin, eyes & clothing. Do	7
ombustible liqui	ds. If static use or storage	generating conditions exist, provide necessary grounding and in or around the house. Use only with adequate ventilation.	1
EP OUT OF REACH			
		rers' safety precautions have been read and understood.	

# **KOPPERS**

## MATERIAL SAFETY DATA SHEET

DATE OF PREP.
May 25, 1977

Approved by U.S. Department of Labor, "Essentially Similar" to Form LSB-005-4).

WHILE THE INFORMATION AND RECOMMENDATIONS SET
FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE
DATE HEREOF, KOPPERS COMPANY MAKES NO WARRANTY
WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY
FROM RELIANCE THEREON.



Specialty Wood Chemicals

Section I — PROD	UCT IDENT	IFICAT		pecialty wood chemi
MANUFACTURER'S NAME			- EMERGENCY TI	LEPHONE NO.
Koppers Company., Inc., Wood Treating C	hemicals De	pt.	314/772	-2200
5137 Southwest Avenue			· ·	
St. Louis. Missou ri 63110	7)	• • • • • • • • • • • • • • • • • • •		
MANUFACTURER & CODE IDENTIFICATION			· · · · · · · · · · · · · · · · · · ·	
Wood Preservative (Water Repellent)	TRADE NAME WOODLOX	Preprin	ne T-RTU	
Section II — HAZA				The state of the s
INGREDIENT	PERCENT		LV	REMARKS
		PPM	mg/M³	nemana,
Pentachlorophenol	5	·	0.5	
Mineral Spirits	85	500	2000	
And the state of the first of the state of t				
The state of the second of the				
, and your market the last seems to be a seem	Side of the state			
Section III —	PHYSICAL	DATA	ONE AND	
BOILING RANGE	FREEZING POIN	<b>"</b> ∠ '-10		
PERCENT VOLATILE 85	VAPOR PRESSUI	es miner	al spirits	2mm
SPECIFIC GRAVITY C: 808 31 Lengths: English Lengths		RATE	orophenal	≺lmm •ther
VAPOR DENSITY heavier than air	SOLUBLE IN	· ·	<del></del>	:tileT
APPEARANCE AMber; mild solvent odor	WATER - % WT.	Insolu	ible	
Section IV — FIRE AND		V U A Z A	DD DATA	an a 1933 sa a sa dala ata
FLASH POINT (METHOD USED) AND 1150 FLASH POINT (METHOD USED) AND 1150 FLASH	MMABLE LIMITS	THAZA	Lei	Uel
SYTINGUISHING MEDIA		,	0.7	6.0
Class B Extinguisher, Water log, foam, Co	Dry Chen	nical	<del></del>	<del></del>
				<del></del>
UNUSUAL FIRE AND EXPLOSION HAZARDS	'	·		
NA COMPANIES AND A SECTION OF THE COMPANIES AND ASSESSMENT OF		<u> </u>		·
	The Art of the		·····	
		·		
Wear full protection clothing. Do not al	low any expo	sed body	surfaces	Toxic vapora
				-
given off from a fire. Use self-containe hydrochloric acid, carbon monoxide.	o preaming a	ipparains	e Durning	may produce
ayarocaroric acia, caroon monoxine,				
<u> </u>			TOLSO	)10411

# MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA	
ee Section II	-
eezing, coughing, irritation of nose, throat, eyes, respiratory difficulty. This product	À
a metabolic stimulant, causes hyperthermia.	
The same of the contract of the same of th	
• • • • • • • • • • • • • • • • • • • •	لــز
case of inhalation, remove to fresh air. In case of eye contact, flush eyes with water	
r at least 15 minutes. Get medical attention. Wash off skin immediately. If swallowed, duce vomiting by sticking finger down throat or giving mustard, soapy, or strong salty	
tter. AVOID-ASPERATION. Repeat until vomit is clear. Get medical attention.	
Section VI — REACTIVITY DATA	
BILITY CONSTABLE! CONDITIONS TO AVOID A Keep contents and freshly treated articles away from flame, food,	£ 5
ck One) >	
ilizing agents	
), CO <sub>2</sub> , HCL, Phenolics	-
5, CO <sub>7</sub> , IIO <sub>1</sub> , I acrostos	-
ARDOUS MAY OCCUR CONDITIONS TO AVOID	-
Ch One) X WILL NOT OCCUR	_
Section VII — SPILL OR LEAK PROCEDURES	
move sources of ignition. Avoid contact, avoid breathing vapors, Use protective mea-	
res outlined in Section VIII below. Absorb spills with an absorbant such as Speedi-Dry	
ocessed clay. Large spills can be diked and pumped into a waste container. See	, &
ction IX below.	$\Box$
sposal must be carried out in accordance with local, state and federal regulations.	
trachlorophenol is toxic to fish material in an approved chemical landful; or high	-
mperature incineration may be used. Do not incinerate closed containers.	-
Section VIII — SPECIAL PROTECTION INFORMATION	
	3
S. Bureau of Mines approved organic vapor and particulate matter masks (Type BE)	<i>.</i>
centrations below TLV in Section II.	
101301041	12
Rubber gloves Chemical goggles	
TR PROTECTIVE EQUIPMENT	
Section IX — SPECIAL PRECAUTIONS	
autions to be taken in Handling and Storing	
mist, vapors, or substantially saturated atmosphere. Avoid contact with skin. Wear	ㅓ
proved goggles. Do not atomize. Use only in well ventilated area. Keep contents and	
	$\dashv$
shly treated articles away from flame, food and living plants.  REFECAUTIONS  When the property of the propert	-
not take internally. Wash contaminated clothing before reusing. Discard contaminated	-
pes. Approved (USBM) respirators can be used if oxygen level above 16% and vapor contration below 2%, otherwise use self-contained units. Do not use when temperature needs 120°F. If spilled, blot up with an absorbant material such as Speedi-Dry absorban	t.
irocessed clay sold by Mineral & Chemicals Co., Edison, N. J.	- (

Chemicals and Coatings

Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-00S-4)
WHILE THE INFORMATION AND RECOMMENDATIONS SET
FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE



DATE OF PREP.  May 25, 1977  May 25, 1977	RETO AND DIS	CLAIMS ALL	LIABILITY	Specialty Wood Cher	
Section I — PRODU	CT IDENT	<b>TIFICAT</b>	ION		
MANUFACTURER'S NAME	**************************************	भगपूर्व अवस	EMERGENC	TELEPHONE NO.	
Koppers Company, Inc., Wood Treating Chen		, or ner be	5	<b>7</b> 0.000	
the same of the sa	icals Deb	τ.	314/7	72-2200	
5137 Southwest Avenue  CITY, STATE, AND ZIP CODE  St. Louis, Missouri 63110		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		
St. Louis, Missouri 63110	ing for years.	STORY S		· · ·	
MANUFACTURER'S CODE IDENTIFICATION		•			
Wood Preservative (Conc.)	Woodto	x Prepri	me Conc.	<u>ੀ</u>	
Section II — HAZAR				endar kept∗r i tro	
The state of the s	3 3 7		LV		
INGREDIENT	PERCENT	PPM	mg/M³	REMARKS	
Pentachlorophenol	22.5		0,5		
Solvents	70	500	1,		
	<del> </del>	<del> </del>	1222		
Ketone Mixture	<b>&lt;</b> 5	50	230	suggested	
			ļ		
The market of the control of the con			<u> </u>		
· · · · · · · · · · · · · · · · · · ·		1 1.41 (			
1 PART SELECTIVE RETT REPORTS AND THE					
Section III — P	HYSICAL	DATA		• • • • • • • • • • • • • • • • • • • •	
SOILING RANGE 175-700 THE SOUTH BOOTHUR		<del>-</del>	50 <sub>F</sub>	•	
PERCENT VOLATILE 75	VAPOR PRESSURE Pentachlorophenol < 1mm				
in local, reate and lederal to 70.	EVAPORATION (BUTYL ACETA	RATE TE - 1) Slov	ver than e	ther	
VAPOR DENSITY 3 24.7 Example South South State South	SOLUBLE IN WATER - % WT.	. Ins	oluble	•	
Amber; mild solvent odor	es et a se et				
Section IV — FIRE AND E		N HAZA	RD DAT	<b>V</b>	
FLASH POINT (METHOD USED) a dille distribution of the PLANM				Lei Uei	
			0	.7   6.0	
Class B Extinguisher, Water fog, foam, CO2,	Dry Cher	mical		·	
y and the second	·	·		·	
And when the state of the state	: .			·	
N. A. WERE AND EXPLOSION HAZARDS					
TO MAKE SANCE THE WARRANT AND A STATE OF A LANGE TO					
and the state of the land and the state of t			<del></del>	· · · · · · · · · · · · · · · · · · ·	
with A will be saling block in a second	<del></del>	<del> </del>			
17001117 (1700) 200118 (1700116) (1700)		· · · · · · · · · · · · · · · · · · ·	<del></del>	<del>, , , , , , , , , , , , , , , , , , , </del>	
Wear full protection clothing. Do not allow as	ny exposed	l body su	rfaces. T	Coxic vapors	
given off from a fire. Use self-contained bre	athing app	aratus.	Burning n	nay produce	
hydrochloric acid, carbon monoxide.					
	<del></del>		<del></del>		

#### ATERIAL SAFETY DATA SHEET Section V — HEALTH HAZARD DATA Section II OF OVEREXPOSURE ezing, coughing, irritation of nose, throat, eyes, respiratory difficulty, This product metabolic stimulant, causes hyperthermia. rents: irritating to eyes and mucous membranes. Inhalation may cause headache - Marie Marie & Land St. wsiness, and nausea. INCY AND FIRST AID PROCEDURES ase of inhalation, remove to fresh air. In case of eye contact, flush eyes with water at least 15 minutes, Get medical attention. Wash off skin immediately. If swallowed, ace vomiting by sticking finger down throat or giving mustard, soapy, or strong salty AVOID ASPIRATION. Repeat until vomit is clear. Get medical attention. Section VI — REACTIVITY DATA UNSTABLE Keep contents and freshly treated articles away from flame, food One)\_\_\_ and living plants. $|\mathbf{X}|$ STABLE ATABILITY (materials to avoid) idizing agents 16 CO2, HCL, Phenolics 4.5 CONDITIONS TO AVOID ₹D0U5 MAY OCCUR RERIZATION X WILL NOT OCCUR Section VII — SPILL OR LEAK PROCEDURES move sources of ignition. Avoid contact, avoid breathing vapors. Use protective meares outlined in Section VIII below. Absorb spills with an absorbant such as Speedi-Dry ocessed clay. Large spills can be diked and pumped into a waste container. ction IX below. अवस्ति । सिन्द्रमान्य केन्स्यात सम्बद्ध sposal must be carried out in accordance with local, state and federal regulations. intachlorophenal is toxic to fish. Do not dispose near water drainage to streams or dies of water. Bury absorbant material in an approved chemical landfill, or high mperature incineration may be used. Do not incinerate closed containers. Section VIII — SPECIAL PROTECTION INFORMATION Bureau of Mines approved organic vapor and particulate matter masks (Type BE) centrations below TLV in Section II TILATION TOLS010414 ECTIVE GLOVES EYE PROTECTION Rubber gloves Chemical goggles - SPECIAL PRECAUTIONS Section IX -Store in closed, properly labeled containers. Avoid prolonged and/or repeated breathing mist, vapors, or substantially saturated atmosphere. Avoid contact with skin. pproved goggles. Do not atomize. Use only in well ventilated area. Keep contents and eshly treated articles away from flame, food and living plants. o not take internally. Wash contaminated clothing before reusing. Discard contaminated Approved (USBM) respirators can be used if oxygen level above 16% and vapor conotherwise use self-contained units. Do not use when temperature illed, blot up with an absorbant material such as Speedi-Dry a aronanad dlay sold by Mineral & Chemicals Co., Edicon, N. J.

Chemicals and Coatings

Chemicals

Approved by U.S. Department of Labor "Essantially Similar" to Form LSB-00S-4)

Approved by U.S. Department of Labor "Essantially Similar" to Form LSB-00S-4)

WHILE THE INFORMATION AND RECOMMENDATIONS SET TO DATE OF PREP.

ATE OF PREP.

WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY



nicals

Section II — PRODUCT IDENTIFICATION  Koppers Company, Inc., Wood Treating Chemicals Dept.  Signature of Company, Inc., Wood Treating Chemicals Dept.  Signature of Company, Inc., Wood Treating Chemicals Dept.  Signature of Company, Inc., Wood Treating Chemicals Dept.  Signature of Company, Inc., Wood Treating Chemicals Dept.  Wood Treating	May 25, 1977		TIELCAT	LON	Specialty Wood Che
Koppers Company, Inc., Wood Treating Chemicals Dept.    State   Company   Co		OCT IDEN	IIFICAI	EMERGENCY	TELEPHONE NO.
St. Louis, Missouri 63110  St. Louis, Missouri 63110  Section II — HAZARDOUS INGREDIENTS  VALUE SECTION III — HAZARDOUS INGREDIENTS  VALUE SECTION III — PHYSICAL DATA  Pentachlorophenol  Section III — PHYSICAL DATA  OULING RANGE  SECTION III — PHYSICAL DATA  PRETING POINT			The state of the second section of the section of the second section of the second section of the second section of the second section of the second section of the second section of the second section of the second section of the second section of the second section of the section of the second section of the section of		
Sction II — HAZARDOUS INGREDIENTS  ***Wood Preservative (Water Repellent)  ***Section II — HAZARDOUS INGREDIENTS  ***********************************		Chemicals D	ept.	314/77	2-2200
St. Louis, Missouri 63110  **Wood Preservative (Water Repellent)**  **Section II — HAZARDOUS INGREDIENTS**  **GREDIENT**  **PERCENT**	5137 Southwest Avenue		ete.		
Section II — HAZARDOUS INGREDIENTS  Woodtox 140T - Ready to Use  Section II — HAZARDOUS INGREDIENTS  VCV  PERCENT  PERCE	St. Louis, Missouri 63110		Faregio esti-	, ,	
Section II — HAZARDOUS INGREDIENTS  ***PPRECENT**	ANUPACTURER'S CODE IDENTIFICATION				**************************************
Section II — HAZARDOUS INGREDIENTS  TLV  PPM	Wood Preservative (Water Repellent)	TRADE NAME		Pondu to	TIOO
Pentachlorophenol  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  A SECTION III — PHYSICAL DATA  Section III — PHYSICAL DATA  A SECTION III — PHYSICAL DAT					Ose
Pentachlorophenol  Mineral Spirits  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  TABLE PRINT PHYSICAL DATA  TO SERVED THE PHYSICAL DATA  Section III — PHYSICAL DATA  TO SERVED THE PHYSICAL DATA  Section III — PHYSICAL DATA  TO SERVED THE PHYSICAL DATA  Section III — PHYSICAL DATA  TO SERVED THE PHYSICAL DATA  TO SERVED THE PHYSICAL DATA  Section III — PHYSICAL DATA  TO SERVED THE PHYSICAL DATA  TO SERVED THE PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  THE PHYSICAL	the state of the s	-	7		
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Section III — PHYSICAL DATA  Section III — PHYSICAL DATA  FREERING FORM			500	1	
Section III — PHYSICAL DATA  OILING RANGE 10 MM 14 300-700  Section 10 PHYSICAL DATA  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  SOUTH ACKNOWLED IN VACOUR PRESSURE MINERAL SPIRITS  SOUTH ACKNOWLED IN VACOUR PRESSURE MINERAL SPIRITS  VACOUR PRESSURE MINERAL SPIRITS  SOUTH ACKNOWLED IN VACOUR PROSSURE MINERAL SPIRITS  SOUTH ACKNOWLED IN VACOUR PROSSURE MINERAL SPIRITS  SOUTH ACK	Willetai Spirits	- 65	300	2000	· · · · · · · · · · · · · · · · · · ·
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Section III — PHYSICAL DATA  OILING RANGE 15 MM No. 300-700  Section 10 — PHYSICAL DATA  VAPOR PRESSURE MINERAL SPIRITS  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR PRESSURE  VAPOR			<u> </u>		
Section III — PHYSICAL DATA    Olding RANGE   300-700   PREZING POLICY   PREZING POLICY	The State of the s				
Section III — PHYSICAL DATA    OILING RANGE   300-700   PREZING POINT   2-10°F	The second secon				
Section IV — FIRE AND EXPLOSION HAZARD DATA  Class B: Water Fog. Alcohol Foam. CO2, Dry Chemical  NUMBER AND EXPLOSION HAZARDS  None	- Sand Pierra And Barrell Blown Barrell Blown Bl	9-1- 4			
Series 300-700  ***RESERVA VOLATILE**  85%  ***COLUMN STATES**  **	Section III -	PHYSICA	DATA		.2
WATER PRESSURE WE SOLUME  WATER PRESSURE MINO SERVITY  NO COOK  APPEARANCE  BOLUBLE	THE SECOND PARTY STORY OF THE SECOND PROPERTY OF THE PROPERTY			0-	``
PECIAL FIRE FIGHTING PROCEDURES  Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.	60 MM Ha 300-700		mine	) F ral animta	Zmm
Amber; mild solvent odor  Section IV — FIRE AND EXPLOSION HAZARD DATA  LASH POINT (METINDO USED)  104 F PMCC (Mineral Spirits)  Class B; Water Fog, Alcohol Foam, CO <sub>2</sub> , Dry Chemical  None  None  Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.	Y VOLUME 85%	AT 20° C	penta	chloropher	iol < lmm
Amber; mild solvent odor  Section IV — FIRE AND EXPLOSION HAZARD DATA  LASH POINT [METHOD USED]  104 F PMCC (Mineral Spirits)  Class B; Water Fog, Alcohol Foam CO2, Dry Chemical  NUMBUAL FIRE AND EXPLOSION HAZARDS  None  Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.			ATE - I) B	owêr than	ether
Section IV — FIRE AND EXPLOSION HAZARD DATA  LASH POINT (METHOD USED)  104 F PMCC (Mineral Spirits)  XYINGUISHING MEDIA  Class B; Water Fog, Alcohol Foam, CO <sub>2</sub> , Dry Chemical  NUBUAL PIRE AND EXPLOSION HAZARDS  None  PECIAL PIRE FIGHTING PROCEDURES  Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.	heavier than air	SOLUBLE IN WATER - % WI	r. Insc	oluble	
Section IV — FIRE AND EXPLOSION HAZARD DATA  LASH FOIRT (METHOD USED)  AND LASH FOIRT (METHOD USED)  AND LASH FOIRT (METHOD USED)  AND LASH FOIRT (METHOD USED)  AND LASH FOIRT (MINISTER AND EXPLOSION HAZARDS  None  NUMBUAL FIRE AND EXPLOSION HAZARDS  None  Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.	PPEARANCE Amheremild solvent odor	· Agenta of the contract of th			
NONE  Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.	Section IV — FIRE AND	EXPLOSIO	NHAZA	PD DATA	$2r_{1}(x) = \sqrt{1/4} h(\mathbf{A}) = r_{1}(x)^{\frac{1}{2}}.$
Class B: Water Fog. Alcohol Foam, CO <sub>2</sub> , Dry Chemical  None  None  Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.					
None  None  Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.	104 F PMCC (Mineral Spirits)	mine	ral spiri	ts 0.	7 6.0
None  None  Pecial Fire Fighting Procedures  Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.	Class B; Water Fog, Alcohol Foam, CO2,	Dry Chemi	cal	· ·	
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Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid. carbon monoxide.	· · · · · · · · · · · · · · · · · · ·		<del> </del>	<del></del>	·
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Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid. carbon monoxide.		1.7			
given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid. carbon monoxide.	Wear full protection clothing. Do not allo	w any expos	ed body s	urfaces.	Toxic vapors
hydrochloric acid, carbon monoxide.					<del></del>
	· · · · · · · · · · · · · · · · · · ·			,	
TOLOGO:	nyurocnioric acid, carbon monoxide.		<del></del>	<del></del>	
				TOLO	0404:-



# MATERIAL SAFETY DATA SHEET

,	Section V — HEALTH HAZARD DATA	
ee Section II.	COMMENTS OF THE PROPERTY OF TH	1
eezing. coughin fir	itation of nose, throat, eyes, respiratory difficulty. This produc	<u>.</u>
a metabolic stimular	nt. causes hyperthermia.	B
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and the second s	Commence of the second of the property of the second of th	
Case of inhalation	remove to fresh air. In case of eye contact, flush eyes with water	
	Get medical attention. Wash off skin immediately. If swallowericking finger down throat or giving mustard, soapy, or strong sale	
<del>_</del>	ATION. Repeat until vomit is clear. Get medical attention.	cy
	Section VI — REACTIVITY DATA	1
UNSTABLE	Keep contents and freshly treated articles away from flame,	ŗ
	food, and living plants.	
MPATABILITY (materials to avoid)	<u> </u>	
Oxidizing agents		
CO, CO2, HCL, Phen	lolics	
	CONDITIONS TO AVOID	
ARDOUS MAY OCCI	UR CORDITIONS TO AVOID	
k One) X WILL NOT	OCCUR	
Sec	ction VII — SPILL OR LEAK PROCEDURES 👙 💎 🦠 😘	
s to be taken in case material emove sources of ign	ition. Avoid contact, avoid breathing vapors. Use protective me	a-
	on VIII below. Absorb spills with an absorbant such as Speedi-Dr	
	e spills can be dike and pumped into a waste container. See	1
	Am POP 14 14 - Mangar or consumer	,
ection IX below.		
entachlorophenol is to	ied out in accordance with local, state and federal regulations.  oxic to fish. Do not dispose near water drainage to streams or absorbant material in an approved chemical landfill, or high	
	on may be used. Do not incinerate closed containers.	
Section Section (specify type	VIII - SPECIAL PROTECTION INFORMATION	
U.S. Bureau of Mines	a approved organic vapor and particulate matter masks (Type BE)	F
TILATION	rations below TLV in Section II.	
Machanic		
Rubber gloves	Chemical goggles TOLS0104	416
IR PROTECTIVE EQUIPMENT		.
	Section IX — SPECIAL PRECAUTIONS	
AUTIONS TO BE TAKEN IN HANDLIN		nσ
	bstantially saturated atmosphere. Avoid contact with skin. Wear not atomize. Use only in well ventilated area. Keep contents and	)
		<u>-</u>
ER PRECAUTIONS	s away from flame, food and living plants.	' * o d
	Wash contaminated clothing before reusing. Discard contaminated	1
noes. Approved (USB entration below 2%, of xceeds 120°F. If spill	3M) respirators can be used if oxygen level above 16% and vapor vertherwise use self-contained units. Do not use when temperature led, blot up with an absorbant material such as Speedi-Dry absorbant.	on- bant
	by Mineral & Chemicals Co., Edison, N. J.	

Chemicals and Coatings



DATE OF PREP.

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-00S-4)

WHILE THE INFORMATION AND RECOMMENDATIONS SET

FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE

DATE HEREOF, KOPPERS COMPANY MAKES NO WARRANTY

WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY

ERON BELIANCE THEREON

ANUFACTURES & NAME			ST IVEN	<b>TIFICAT</b>	IUN	TELESHONE NO
		alogai	ettare milita			TELEFRONE NO.
Coppers Company.	, Inc., Wood Tre				314/7	72-2200
137 Southwest Ave	nue		***			
t. Louis, Missou	ri 63110	<del></del>	•			····
NUPACTURER'S CODE IDENTI	FICATION		•		,	
obuct class Wood Preservative	(Water Penellen	41 207 Mar 1 121	Woodto	<u> 140⊤ /</u>	Concentra	+ <u>~</u>
VOOG Preservative	Section II -	HAZAR	DOUS IN			te)
	Section in -	TUAY 7AIN			LV	
GREDIENT		in the second of	PERCENT	PPM	mg/M³	REMARKS
Pentachlorophenol			22		0.5	
Mineral Spirits		<del></del>	20-30	500	2000	·
Vinicial Spirits		<del></del>	20-30	300	2000	
			<del> </del>	<del> </del>	+	
				<del> </del>		**************************************
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	d as As "Success on					
			HYSICAL	. DATA		
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	istabet bag etc.	in Inggal	EVAPORATION	RATE	ver than et	
-0 = 11 97						ile r
SECIFIC GRAVITY		39817000	SOLUBLE IN	nec	duble	
POR DENSITY heavier	than air		SOLUBLE IN WATER - % WY.	Insc	oluble	
PEARANCE Amber	than air (1893); mild solvent odd	or	WATER - % WT.			
PEARANCE Amber	than air ; mild solvent odd	or E AND E	KPLOSIO		RD DATA	ei
PEARANCE Amber  So odor Amber  So odor Method used)  1040 F PMCC	than air ; mild solvent odd ection IV — FIR (mineral spirits	E AND E	KPLOSIO ABLE LIMITE mineral	N HAZA	RD DATA	el Uel
PEARANCE Amber  Separation Amber  Separation (METHOD USED)  104 F PMCC	than air ; mild solvent odd ection IV — FIR (mineral spirits	E AND E	KPLOSIO ABLE LIMITE mineral	N HAZA	RD DATA	el Uel
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PECIAL FIRE FIGHTING PROCE  Wear full protect  Technology  Method Used)  104°F PMCC  Tinguishing Media  Class B Extinguish  Wear full protect	than air  mild solvent ode  ction IV — FIR  (mineral spirits  er, Water fog, for  HAZARDS  tion clothing, D	or  EAND E  Coam, CO2	WATER - % WY.  XPLOSIO ABLE LIMITE     mineral , Dry Cher	N HAZA spirits mical	RD DATA	Toxic vapors
PEARANCE Amber  S(ASH POINT (METHOD USED)  104°F PMCC TINGUISHING MEDIA Llass B Extinguish  USUAL FIRE AND EXPLOSION IA  ECIAL FIRE FIGHTING PROCE Wear full protect given off from a	than air mild solvent odd ection IV — FIR mineral spirits er, Water fog, fo	o not allow	WATER - % WY.  XPLOSIO ABLE LIMITE     mineral , Dry Cher	N HAZA spirits mical	RD DATA	Toxic vapors

## MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA	,
Section II	L
TOP OVEREXPOSURE A THE STATE OF	
ezing, "coughing, "irritation of nose, throat, eyes, respiratory difficulty. This product metabolic stimulant, causes hyperthermia.	3
vents: dizziness, narcosis at high exposure levels	1
Little Laboration (1978) and the second of the contract of the second of	1
ENCY AND FIRST AID PROCEDURES	1
case of inhalation, remove to fresh air. In case of eye contact, flush eyes with water	1
at least 15 minutes. Get medical attention. Wash off skin immediately. If swallowed, uce vomiting by sticking finger down throat or giving mustard, soapy, or strong salty	1
uce vomiting by sticking finger down throat or giving mustard, soapy, or strong salty er. AVOID ASPIRATION. Repeat until vomit is clear. Get medical attention.	1
Section VI — REACTIVITY DATA	
CONDITIONS TO AVOID Keep contents and freshly treated articles away from flame, food,	.]
One) STABLE and living plants.	
idizing agents	1
, CO <sub>2</sub> , Phenolics	1
, 552, 2, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3,	1
RDOUS MAY OCCUR CONDITIONS TO AVOID	1
AERIZATION One)  WILL NOT OCCUR	1
Section VII — SPILL OR LEAK PROCEDURES TO BE TAKEN IN GASE MATERIAL IS RELEASED ON SPILLED	4
move sources of ignition. Avoid contact, avoid breathing vapors. Use protective mea-	┦~
res outlined in Section VIII-below. Absorb spills with an absorbant such as Speedi-Dry	]
ocessed clay. Large spills can be diked and pumped into a waste container. See	
ction IX below.	
sposal must be carried out in accordance with local, state and federal regulations.	1
ntachlorophenol is toxic to fish. Do not dispose near water drainage to streams or dies of water. Bury absorbant material in an approved chemical landfill, or high	1
nperature incineration may be used. Do not incinerate closed containers.	1
Section VIII — SPECIAL PROTECTION INFORMATION	1
RATORY PROTECTION (specify type)	1
rmally not needed; USBM approved organic vapor and particulate matter masks (type BE)	1
ILATION MECHANICAL (general) OTHER	-
TOLS010418	ļ
Rubber gloves Chemical goggles	
Section IX — SPECIAL PRECAUTIONS	1
ore in closed, properly labeled containers. Avoid prolonged and/or repeated breathing of	
ist, vapors, or substantially saturated atmosphere. Avoid contact with skin. Wear ap-	Ì '
oved goggles. Do not atomize. Use only in well ventilated area. Keep contents and	1
eshly treated articles away from flame, food and living plants.	1:
n not take internally. Wash contaminated clothing before reusing. Discard contaminated	`~
oes. Approved (USBM) respirators can be used if oxygen level above 16% and vapor	1
ncentration below 2%, otherwise use self-contained units. Do not use when temperature	1
ceeds 120°F. If spilled, blot up with an absorbant material such as Speedi-Dry absorbant,	1
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## WOOD TREATING CHEMICALS

## KOPPERS COMPANY, INC.

5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110

314 - 772-2200

### PRODUCT: INFORMATION DATA

WOODTOX\* PRE-PRIME CONCENTRATE

"一种"的"数","2000"

TANK BURNEYA KAN

Trade Name Penta water repellent preservative concentrate 

Wood Treating Name Woodtox Pre-Prime Concentrate

Chemical Name Penta water repellent preservative concentrate

Description Clear, medium amber color solution 

Market and the state of the same of the same Penta Content 21.2% by weight technical pentachlorophenol meeting Federal

Specification TT-W-570

Non-Volatile Content 53.0% by weight

0.9784 at 15.5 deg. C. (typical) Specific Gravity

Weight per Gallon 8.15 pounds at 15.5 deg. C. (typical)

Pour Point Plus 18 deg. F. 

Flash Point 100 deg. F. (Tag. Closed Cup) (minimum)

Dilution Instructions

Woodtox Pre-Prime concentrate is readily miscible with mineral spirits or other light petroleum solvents without heat or special agitation. To cut back to the normal 5% pentachlorophenol readyto-use strength, one gallon or part by volume of the concentrate should be diluted with four gallons or parts by volume of mineral spirits to make five gallons of Woodtox\* Pre-Prime. Heavier petroleum solvents than mineral spirits are not recommended as diluents since paintability of the treated wood would be affected. Federal Specification TT-T-0291a, Grade 1, or ASTM Standard D-235-39 can be used for procurement of a suitable mineral spirits diluent. A distillation range of 330 to 385 deg. F. for this type of light petroleum solvent is typical of current refinery production, but in many areas and for a small price differential LEP mineral spirits with an end point as low as 350 deg. F. is readily available. The LEP mineral spirits is also readily miscible with Woodtox Pre-Prime concentrate and the speed upon drying of the treated wood may be as much as 25%. Xylol and other lighter solvents are not recommended.

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### WOODTOX PRE-PRIME CONCENTRATE

Swellometer Efficiency

This concentrate, when properly diluted, will make a water repellent solution having a swellometer efficiency of 60% minimum.

Paintability

The ready-to-use solution made with this concentrate dries to a firm film and contains a minimum of paraffin or other water repellent ingredients that tend to interfere with paintability. length of time that should elapse between the time the wood is treated and the time that paint, varnish, or other finishes are applied depends upon how soon the excess mineral spirits used as a carrier can get out of the wood. The mineral spirits carrier may be "trapped" when sash parts are bulk stacked or bundled too tightly and dip treated; doors and plywood flat stacked are another problem. However, where there is free air circula tion to volatilize the light solvent from the wood surfaces, Woodtox Pre-Prime open tank treated millwork, lumber, or plywood can usually be finished within 48 to 72 hours after the treatment. Woodtox Pre-Prime Concentrate meets paintability tests or standards of Federal Specification TT-W-00572a, the NWMA, and CS 262-63. 

itorage

Some sedimentation may occur after long standing, but this is relatively insignificant on a weight basis and should not reduce the efficiency of the product after dilution. This concentrate thickens, when exposed to low temperature, but returns to normal fluidity when stored at ordinary room temperatures. Containers should be thoroughly agitated before removing contents when temperature of the concentrate is below 40 deg. F.

Safe Handling of Pentachlorophenol

See Wood Treating Chemicals Co. Bulletin 1049 entitled "Safety Measures and Precautions for Handling Solutions Containing Pentachlorophenol."

Packaging

5 gallon and 55 gallon drums, and bulk shipments in tank cars

Shipping Class

Wood Preservative, Liquid NOIBN

Production Points

The state of the s

Saint Louis, Missouri and Portland, Oregon

ipping Points

Saint Louis, Missouri and Portland, Oregon.

TOLS010420

Printed in U.S.A.

## KOPPERS MATERIAL SAFETY DATA SHEET

and Coatings WHILE THE INFORMATION AND RECOMMENDATIONS SET. FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE



### DATE HEREOF, KOPPERS COMPANY MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY May 25, 1977 FROM RELIANCE THEREON. Specialty Wood Chemicals Section I — PRODUCT IDENTIFICATION Koppers Company, Inc., Wood Treating Chemicals Dept. 314/772-2200 5137 Southwest' Avenue St. Louis, Missouri 63110 MANUFACTURER'S CODE IDENTIFICATION Wood Preservative (concentrate) Timbertox 40 Concentrate Section II — HAZARDOUS INGREDIENTS PERCENT REMARKS € PPM i mg/M³ Pentachlorophenol 40 0.5 Ketone Mixture 40 80 230 suggested Hydrocarbon Solvent 500 in the control of the The state of the s The second state of the second second Section III — PHYSICAL BOILING RANGE 175+ FREEZING POINT >-10° F VAPOR PRESSURE AT 20° C pentachlorophenol < 1mm EVAPORATION RATE (BUTYL ACETATE = 1) slower than ether SOLUBLE IN VAPOR DENSITY heavier than air 49 59 79 ger m Insoluble APPEARANCE Dark; mild solvent odor Section IV — FIRE AND EXPLOSION HAZARD DATA >100-F 6.0 EXTINGUISHING MEDIA Class B Extinguisher, Water f.og, foam, CO2, Dry Chemical 201100g (ser cod) UNUSUAL FIRE AND EXPLOSION HAZARDS Ketone vapors can form explosive vapors at elevated temperatures. Control all ignition sources when in use. Ketone vapors are heavier than air. According prototogical plants and The state of the s was the second of the second o Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors

given off from a fire. Use self-contained breathing apparatus. Burning may produce

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hydrochloric acid, carbon monoxide.

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## MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA
e Section II
eezing, coughing, irritation of nose, throat, eyes, respiratory difficulty. This product
a metabolic stimulant, causes hyperthermia.
elvents: irritating to eyes and mucous membranes. Inhalation may cause headache,
owsiness, and nausea.
case of inhalation, remove to fresh air. In case of eye contact, flush eyes with water or at least 15 minutes. Get medical attention. Wash off skin immediately. If swallowed, duce vomiting by sticking finger down throat or giving mustard, soapy, or strong salty
ater. AVOID ASPIRATION. Repeat until vomit is clear. Get medical attention.
Section VI — REACTIVITY DATA
UNSTABLE   CONDITIONS TO AVOID   CONDITIONS
A One) X STABLE and living plants.
MPATABILITY (materials to avoid) xidizing agents
O, CO <sub>2</sub> , HCL, Phenolics
AND AND AND AND AND AND AND AND AND AND
ARDOUS MAY OCCUR CONDITIONS TO AVOID
ck One) X WILL NOT OCCUR
Section VII — SPILL OR LEAK PROCEDURES
emove sources of ignition. Avoid contact, avoid breathing vapors. Use protective mea-
ures outlined in Section VIII below. Absorb spills with an absorbant such as Speedi-Dry
rocessed clay. Large spills can be diked and pumped into a waste container. See
ection IX below.
Disposal must be carried out in accordance with local, state and federal regulations.  Tentachlorophenol is toxic to fish. Do not dispose near water drainage to streams or
odies of water. Bury absorbant material in an approved chemical landfill, or high
emperature incineration may be used. Do not incinerate closed containers.
Section VIII — SPECIAL PROTECTION INFORMATION
J. S. Bureau of Mines approved organic vapor and particulate matter masks (Type BE)
ntilation   centrations below TLV in Section II.
MECHANICAL (general)
Rubber gloves Chemical goggles
HER PROTECTIVE EQUIPMENT
Section IX — SPECIAL PRECAUTIONS
Store in closed, properly labeled containers. Avoid prolonged and/or repeated breathing
of mist, vapors, or substantially saturated atmosphere. Avoid contact with skin. Wear
approved goggles. Do not atomized. Use only in well ventilated area. Keep contents and
freshly treated articles away from flame, food and living plants.
Do not take internally. Wash contaminated clothing before reusing. Discard contaminated
shoes. Approved (USBM) respirators can be used if oxygen level above 16% and vapor con-
centration below 2%, otherwise use self-contained units. Do not use when temperature exceeds 120°F. If spilled, blot up with an absorbant material such as Speedi-Dry absorbant
a processed clay sold by Mineral & Chemicals Co., Edison, N.J.

Chemicals and Coatings

MATERIAL SAFETY DATA SHEET

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-005-4)

MATERIAL SAFETY DATA SHEET

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-005-4)

MATERIAL SAFETY DATA SHEET

FORTH HER INFORMATION AND RECOMMENDATIONS SET

FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE

WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY

FROM RELIANCE THEREON.

SUD



June 3, 1977	FROM RELIAN				Specialty Wood Chemical
MANUFACTURER & NAME WALLS	Section I — PRO				Y TELEPHONE NO.
Koppers Company	Inc., Wood Treating (				4/772-2200
5137 Southwest Av	enue ***	語為一種的自己			
St. Louis, Missou	ri 63110				
MANUFACTURER'S CODE IDENT					
Water Repellent		WR 340	CONCE	NTRATE	,
	Section II — HAZ	ARDOUS IN	GREDIE	NTS	
INGREDIENT	三年的 <b>的</b>	PERCENT	TI		REMARKS
			PPM	mg/M³	
Ketone Mixture		95	200	700	These are sugges ted levels only
				ļ	
			*.	·	
	Section III	- PHYSICAL	DATA	l	<u></u>
BOILING RANGE	· · · · · · · · · · · · · · · · · · ·	PREEZING POIN		i j	
PERCENT VOLATILE 95%	TO ALBERT WHEELE GREEN AND BUILDING TO SEE	VAPOR PRESSU	R E		
SPECIFIC GRAVITY		EVAPORATION			- 4 la - a
(H <sub>2</sub> O = 1)		SOLUBLE IN			etner
APPEARANCE		WATER - % WT.	∠ 5%	<u></u>	·
AND ODOR	action IV FIRE ANI	D EVELOSIO	MUASTAL		· · · · · · · · · · · · · · · · · · ·
	ection IV — FIRE AN	LAMMABLE LIMITS		KU DAT	Lei Uei
FLASH POINT (METHOD USED) 185 F PMCC EXTINGUISHING MEDIA		Lower: 15,000	) ppm		
Extinguishing MEDIA  Dry Chemical, CC	2. Alcohol foam				
					<del></del>
UNUSUAL FIRE AND EXPLOSION	HAZARDS				<del></del>
None		<del></del>			
			<del></del>		
					·
			•		
		·			•
Self-contained bre	athing apparatus with a	full facepiece	operated	in the pr	essure demand
(positive pressure	) mode.				•
,		,			
				TOL	S010423
<del></del>		340 (340 u			

## MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA	
ne established: See Section II	
ins of overexposure and eye irritant. Inhalation: nose irritation, drowsiness, loss of	了
onsciousness	
The state of the s	i i
	K-
ish affected area with water, use soap or mild detergent. If swallowed, DO NOT induced	e
niting. For inhalation exposure, remove to fresh air. If breathing has stopped, use	
ificial respiration. Get Medical attention.	<i>To</i> " +
Section VI — REACTIVITY DATA	
UNSTABLE CONDITIONS TO AVOID	i i
k One) X STABLE	÷/
patability (materials to avoid) oid oxidizers and sources of igniting.	
tic gases and vapors (such as CO) released in fire.	
ARDOUS MAY OCCUR CONDITIONS TO AVOID	
MERIZATION  † One)  X WILL NOT OCCUR	7
. Section VII — SPILL OR LEAK PROCEDURES	·
TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED on spill or leaks on absorbant paper; burn paper in incinerator; absorb in vermiculity	
by spirit of leaks on absorbant paper, butti paper in intellerator, absorb in verificant	
	$\neg$
	-
neration is best method, or absorb in vermiculite and dispose in landfill. Do not	<del>, :  </del>
aminate water.	
attitude water.	
Section VIII — SPECIAL PROTECTION INFORMATION	
necessary 4200 ppm Organic vapor canister gas mask; self-contained or supplied air	
LOCAL EXHAUST SPECIAL respirator.	
ILATION MECHANICAL (general)	
CTIVE GLOVES ber gloves  EYE PROTECTION Chemical goggles (splash safety)	
PROTECTIVE EQUIPMENT	
Section IX — SPECIAL PRECAUTIONS	
UTIONS TO BE TAKEN IN HANDLING AND STORING	
id skin contact. Avoid prolonged breathing of vapors. Do not use near a source of ion. Avoid contamination of feed or food stuffs. Store in tightly closed containers in	
location. Ventilated area.	
location: Ventilated at ea.	
contaminated clothing before reuse. Do not reuse containers. Read label thoroughly	,
his product is to be mixed with other toxic materials.	
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## KOPPERS

### MATERIAL SAFETY DATA SHEET

Chemicals de la contraction de

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSBWHILE THE INFORMATION AND RECOMMENDATIONS SET
FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE
DATE HEREOF, KOPPERS COMPANY MAKES NO WARRANTY
WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY
FROM RELIANCE THEREON



DATE OF PREP.

December 13, 1976

December 13, 1976

December 13, 1976

December 13, 1976

December 13, 1976

December 13, 1976

Koppers Company, India-Wood Treating C	hemicals De	pt.	314-	772-2200
5137 Southwest Avenue		Agandgan.		
ITY, STATE, AND ZIP CODE		\$		
St. Louis, Missouri 63110 ANUFACTURER'S CODE IDENTIFICATION	(W) (V)	· · · · · · · · · · · · · · · · · · ·		
RODUCT CLASS	TRADE NAME PE	TROSET	II	
Section II — HAZA	RDOUS IN	GREDIE	NTS TH	THE PARTY OF THE
NGREDIENT ( )	PERCENT		mg/M³	REMARKS
1977年,1987年,1987年,1987年,1987年,1987年				
No hazardous ingredients as defined in sect	ion 0.57 of	he regul	ations pro	mulgated unde
Public Law 85-742 and incorporated in MIL	- Standard	- 1341A	and Fed.	Standard 313 o
U.S. Department of Labor definition 29CFR	1501.2(S).			
	\$4.			
The state of the s				
Séction III 🖴	PHYSICAL	DATA	And Park	Designation of
ILING RANGE	FREEZING POI	NT N	lot defined	
Not defined	FREEZING POIL  VAPOR PRESSU  AT 20° C	IRE	lot defined lot defined	
Not defined  Not defined  Not defined  Not defined	VAPOR PRESSU	RATE		
Not defined  Not defined  Not defined  Not defined  Not defined  1.03	VAPOR PRESSUAT 20° C	RATE TE = 1) N	lot defined	
Not defined  RCENT VOLATILE VOLUME  Not defined  1.03  POR DENSITY  PEARANCE D ODOR  Not defined  Dark Liquid	VAPOR PRESSUAT 20°C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER - % WT	RATE TE = 1) N	lot defined lot defined lot defined	
Not defined  RICENT VOLATILE VOLUME  Not defined  ECIFIC GRAVITY (0 = 1)  FOR DENSITY  Not defined  PEARANCE D ODOR  D DARK Liquid  Section IV — FIRE AND	VAPOR PRESSUAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER - % WT	RATE TE = 1) N	lot defined lot defined lot defined	
Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  PERRANCE DODOR DARK Liquid  SECTION IV FIRE AND  ASH POINT (METHODUSED) (COL) 375 F.	VAPOR PRESSLAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER • % WT	RATE TE = 1) N	lot defined lot defined lot defined	
Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  CEARANCE DODOR DARK Liquid  SECTION IV FIRE AND  SH POINT (METHODUSED) (COL) 375 F.  FINGUISHING MEDIA  CO2, Dry Chemical, Fo	VAPOR PRESSLAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER • % WT  EXPLOSIO MABLE LIMITS N	RATE TE = 1) N	lot defined lot defined lot defined	
Not defined  RECHT VOLATILE VOLUME  Not defined  1.03  POR DENSITY  Not defined  PEARANCE D ODOR  Dark Liquid  Section IV—FIRE AND  ASH POINT (METHORUSED)  (COL) 375 F.  TINGUISHING MEDIA  CO2, Dry Chemical, Fo	VAPOR PRESSLAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER • % WT  EXPLOSIO MABLE LIMITS N	RATE TE = 1) N	lot defined lot defined lot defined	A Lei Uei
Not defined  RCENT VOLATILE VOLUME  Not defined  CO1)  Not defined  PEARANCE D ODOR  Dark Liquid  Section IV — FIRE AND  ASH POINT (METHOD USED)  (COL) 375 F.  TINGUISHING MEDIA  CO2, Dry Chemical, Fo	VAPOR PRESSLAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER - % WT  EXPLOSIO MABLE LIMITS N	RATE TE = 1) N	lot defined lot defined lot defined	A Lei Uei
Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  PERFARANCE DODOR  Dark Liquid  Section IV—FIRE AND  ASH POINT (METHODUSED) (COL) 375 F.  TINGUISHING MEDIA  CO2, Dry Chemical, Fo	VAPOR PRESSLAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER · % WT  EXPLOSIO MABLE LIMITS N  am	RATE TE = 1) N	lot defined lot defined lot defined lot defined	Lal Ue
Not defined  RICENT VOLATILE VOLUME  Not defined  O-1)  POR DENSITY  Not defined  PEARANCE DODOR  Dark Liquid  Section IV—FIRE AND  SSH POINT (METHOQUISED)  (COL) 375 F.  TINGUISHING MEDIA  CO2, Dry Chemical, Fo	VAPOR PRESSLAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER · % WT  EXPLOSIO MABLE LIMITS N  am	RATE TE = 1) N	lot defined lot defined lot defined lot defined	Lal Ue
Not defined  RICENT VOLATILE VOLUME  Not defined  SCIPIC GRAVITY O = 1)  POR DENSITY  Not defined  PEARANCE D ODOR  Dark Liquid  Section IV FIRE AND  ASH POINT (METHODUSED) (COL) 375 F.  TINGUISHING MEDIA  CO2, Dry Chemical, Fo	VAPOR PRESSLAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER · % WT  EXPLOSIO MABLE LIMITS N  am	RATE TE = 1) N	lot defined lot defined lot defined lot defined	Lal Uei
Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  Not defined  PERFARANCE DODOR  Dark Liquid  Section IV—FIRE AND  ASH POINT (METHODUSED) (COL) 375 F.  TINGUISHING MEDIA  CO2, Dry Chemical, Fo	VAPOR PRESSLAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER · % WT  EXPLOSIO MABLE LIMITS N  am	RATE TE = 1) N	lot defined lot defined lot defined lot defined	Lal Uei
Not defined  RCENT VOLATILE VOLUME  Not defined  SCIFIC GRAVITY  1.03  POR DENSITY  Not defined  PEARANCE D ODOR  Dark Liquid  Section IV—FIRE AND  ASH POINT (METHODUSED)  (COL) 375 F.  TINGUISHING MEDIA  CO2, Dry Chemical, Fo	VAPOR PRESSLAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER · % WT  EXPLOSIO MABLE LIMITS N  am	RATE TE = 1) N	lot defined lot defined lot defined lot defined	Lal Uei
Not defined  RCENT VOLATILE VOLUME  Not defined  ECIFIC GRAVITY 1.03  POR DENSITY  POR DENSITY  POR DENSITY  PEARANCE D ODOR  Dark Liquid  Section IV — FIRE AND  ASH POINT (METHODOUSED)  (COL) 3755 F.  TINDUISHING MEDIA  CO2, Dry Chemical, Fo	VAPOR PRESSLAT 20° C EVAPORATION (BUTYL ACETA SOLUBLE IN WATER · % WT  EXPLOSIO MABLE LIMITS N  am	RATE TE = 1) N	lot defined lot defined lot defined lot defined	Lal Uei

### MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA	的推翻了
	L M
Not defined A Service	S. C.
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	1800 V
	- 100
ERGENCY AND FIRST AID PROCEDURES Not defined	
	***
	<u> </u>
Section VI — REÁCTIVÍTY DATA	STATE OF THE
CONDITIONS TO AVOID Avoid excessive heat and strong oxidizers.	BCA:
CCH One) XXX STABLE Avoid excessive heat and strong oxidizers.	\$7.50 \$0.50
OMPATABLE TY (Implerials to quaid)	35 pm
Avoid strong oxidizers.	
er Control Market and the Market of the Control of	
CONDITIONS TO AVOID 1	· · ·
YMERIZATION MAY OCCUR	; · · ·
will Not occur under normal operating conditions.	 
Section VII — SPILL OR LEAK PROCEDURES	<b>新教教</b>
PS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED	1 - (12
Handle as an oil spill.	No.
TE DISPOSAL METHOD  Incine tation.	
Incineration.	
10   10   10   10   10   10   10   10	ens (e.
Section VIII EDECIAL PROTECTION INFORMATION	er menters
Section VIII — SPECIAL PROTECTION INFORMATION	
TILATION MECHANICAL (general)	
TECTIVE GLOVES	i i
Impervious Material Face mask or safety goggles.	ļ.
Impervious outer clothing.	
Section IX — SPECIAL PRECAUTIONS	1
autions to be taken in Handling and Storing and art and art are also of this type.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
not store at temperatures above 150°F.	fs.
	i.
A CONTRACT OF THE SECOND SECON	in the second
old prolonged or repeated contact with the skin.  TOLS01042	10
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The state of the s	

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## MANENAL SAFETY DATA SHEET

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	SECTION I	1	
	MANUFACTURES'S NAME OF TELEPHONE NO (314) 694-1000	• \$ <sup>3</sup>	
	ADDRESS (Number, Street, Stilly State, and ZIP Code) 800 NORTH LINDBERGH BLVD St. Louis, Mg. 63166	, ; 31	4 July 11
	CHEMICAL NAME AND SYNONYMS Pentachlorophenol PENTA	,. ·,	
	CHEMICAL AMILY Phonol		
	SECTION II MAZARDOUS INGREDIENTS		
	PAINTS, PRESERVATIVES, & SOLVENTS TLY ALLOYS AND METALLIC COATINGS	7.	TLV (Units)
ζ	PIGMENTS BASE METAL		
ľ	CATALYST		-
0	VEHICLE METALLIC COATINGS		
	SOLVENTS FILLER METAL PLUS COATING OF CORE FLUX		
į	ADDITIVES 5 OTHERS		
Ĺ	OTHERS OF THE PROPERTY OF THE		
Ì	HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	5,	TLV (Units)
Ī			
1	CONTRACTOR OF THE CONTRACTOR O		
			$\mathcal{C}_{\mathcal{A}}^{(i)} = \mathcal{V}_{\mathcal{A}}^{(i)}$
Ĺ	THE PROPERTY OF THE PROPERTY O		
	. Order 1911 in 1915 beginn Sugaria kantar and dependent of the second o		· ·
•	SECTION JII PHYSICAL DATA		
	Cat 760 mm (Decomp)	>	
ļ	VAPOR PRESSURE INTO HOLL & TOOC BY VOLUME (%)		I.A. *
į,	VAPOR DENSITY LAIR TIN THE N.A. BOAC TO THE TOTAL THE PROPERTY LAIR TIN THE TOTAL THE PROPERTY LAIR TIN THE TOTAL THE PROPERTY LAIR TIN THE TOTAL THE PROPERTY LAIR TIN THE TOTAL THE PROPERTY LAIR TIN THE TOTAL THE PROPERTY LAIR TIN THE TOTAL THE PROPERTY LAIR TIN THE TOTAL THE PROPERTY LAIR TIN THE TOTAL	<	
ķ	SOLUBILITY NEW 1550 Chegligible 16ppm	. ·	
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	The state of the s		
•	FLASH POINT HIM OF THE AND EXPLOSICE HAZARD DATA		Ual
4	EXTINGUISHING MEDIA Water fog, foam, CO2		
よいい	STICCIAL FIRE FIGHTING PROCEDURES N.A.	1	
1.			
	TOLS010427		
İ	TOLSO TOLSO		!
	THE PROPERTY OF THE PROPERTY O		

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SECTION VA HEALTH HAZALD DATA	
THATSHOLD LIMIT WALVE STOP 5 mg/cusmt	
Successing acoughing treitation of nose, throat, eyes, respiratory	
difficulty, aliver damage.	Marie Color
twingency and einst aid procedures . Wash off immediately with soap and water. Change	n Najar
out of contaminated clothing. If accidentally swallowed, cause vomiting and	, ii , ie ,
refer to physician for systematic treatment.	

Mary Contract Contrac	SECTION VI REACTIVITY DATA
STABILITY #	UNSTABLE CONDITIONS TO AVOID
	STABLE
INCOMPATABILITY (	aterials to avoid! None
HAZARDOUS DECOME	osition products. CO, CO <sub>2</sub> , HCl, Phenolics
HAZARDOUS	MAY OCCUR
POLYMERIZATION	WILL NOT OCCUR
**************************************	

Light Approximate the state of	
SECTION VILESPILL OR LEAK PROCEDURES	
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED ON SPILLED Sweep up and dispose of in approved	
chemical landfill in accordance with local and state regulations.	
	-
WASTE DISPOSAL METHOD Bury in chemical landfill	
THE RESIDENCE OF THE ACTUAL PROPERTY OF THE PR	

	SECTION VIII SPECIAL PROTECTION I	
	tion (Spreily tree) Burcau of Mines dust respi	
	ALOCAL EXHAUST	SPECIAL ULION)
	MECHANICAL (General)	OTHER
PROTECTIVE GLOVES	Rubber	Chemical goggles
OTHER PROTECTIVE	QUIPMENT OF not wear contaminated cloth	

	TOLS010428
Avoid dust, vapor, mist (inhalation). Wear approved goggles	
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING Keep off skin. Keep away from	mouth.
SECTION IN SPECIAL PRECAUTIONS	
· 医眼睛的 网络眼球 医乳球性 化二甲基酚基酚基酚 医二甲基酚 医二种甲基酚 医二甲基酚 医二甲基酚 医二甲基酚	

HOII: EPW

12/2/71

## **Material Information Bulletin**

# © Environmental Health & Toxicology



Warning Stateme	ent	Name		
HARMFUL OR FATAL IF SWALLOWED COMBUSTIBLE		BASE OIL WT-L		
A Tryong	C101710105111(31)	al angungganggangan san san san san san san san san san s		
		And the second s	%	
	Straight run petroleum distillat	e	100%	
3 Pas	निर्देश हैं जिल्ला है है है है है है है है है है है है है		2020 (612	
Threshold Limit Value (TLV)	The suggested TLV is 5 mg/Cu. a daily 8-hour exposure. This is	M. (milligrams of material po	er cubic meter of air) for	
Eye Irritation	This material is not expected to may be noted following contact	o be a primary eye irritant. H t. (See note below.)	owever, minor irritation	
Skin Irritation	This material is not expected to may be noted following prolon	b be a primary skin irritant. H ged or frequently repeated co	lowever, minor irritation ontact. (See note below.)	
Systemic Effects	This material is not expected to if swallowed and aspirated into Prolonged exposure to high vap and symptoms of central nervo loss of coordination. Affected removed from the exposure are pneumonitis.	the lungs, chemical pneumo por concentrations of this ma ous system depression such as persons normally experience	nitis may result. terial may cause signs , headache, dizziness, complete recovery when	
2			TOLS010429	
	Note: We have no laboratory of from the results of laboratory	data on this material. These c ratory tests on similar materi	onclusions are derived als.	

Note Disclaimer of Warranty, Page 4

Chevron Environmental Health Center/225 Bush Street, San Francisco, CA 94104 J. A. Spence, Ph. D. Reference Phone Number (415) 232-1514, Ext. 4178 or 2027 (Approved by U.S. Department of Labor, "Essentially simila to Form OSHA 20, Material Safety Data Sheet"

No. 836 - 197

C- FINCE VI	tion will then Aid Thomashures
ye ontact	Flush eyes with fresh water for at least 15 minutes. If irritation persists get medical attention.
kin ontact	Use good personal hygiene practices while working with this material. Wash contaminated clothing before reuse.
halation	If there are signs or symptoms of overexposure to vapor or mist of this material, move the individual to an uncontaminated area. If breathing has stopped, apply artificial respiration. Get medical attention immediately.
igestion	If this material is swallowed and aspirated, chemical pneumonitis may result. If swallowed, DO NOT induce vomiting: Get medical attention immediately.
D-Signifi	Tourse de la constant
rotection	No eye protection is recommended while working with this material.
piratory rotection	The vapor and mist concentrations of this material must be kept below applicable standards (see Section B - TLV). If this cannot be achieved, the use of an approved respirator for organic vapor and mist, approved supplied-air or approved self-contained beathing assume and it recommended.
kin rotection	Avoid prolonged or frequently repeated skin contact with this material. If the conditions or frequency of use increase the danger of exposure, skin contact can best be avoided by wearing impervious neoprene or rubber gloves.
entilation	Use adequate ventilation to keep the vapor and mist concentrations of this material below applicable standards (see Section B - TLV).
ther	
E-Fite Pic	Justingtoin Halkollanceshicht
ash Point est method)	(P-M)150+°F   Flammable Limits   lower limit   upper limit   upper limit   lower limit
utoignition emperature	Extinguishing CO <sub>2</sub> , Dry Chemical, Foam, Water Spray
cial ire Fighting rocedures	For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus. See Section F - Hazardous Decomposition Products for unusual decomposition products. Read the entire bulletin.

			Manager and the control of the contr		THE STATE OF THE PARTY WAS ASSESSED.	
F General	W Deit		<del></del>		and the second state of th	ما المداد و المداد
Stability	Stable	X	Conditions	nga madilipengahagi sai madilindama aka 17 da 17 mililah samitida, mi		
(thermal, light, etc.)	Unstable		to Avoid			
Incompatibility	May react w	ith st	rong oxidizing	g material,		
(materials to avoid)				-	•	
Hazardous Decomposi Products		nbustie Ifur; i	on forms carb ncomplete co	oon dioxide and wa imbustion can prod	ater vapor and may produce duce carbon monoxide.	·
Hazardous .	May Occur	, ,	Conditions		<del></del>	
Polymerization	Will not Occur	X	to Avoid			
		ليستركب	270	desperience desperience desperience desperience desperience desperience desperience desperience desperience de	The state of the s	
j '			12,10101	يعو بالمدين والمدينة والمدينة والمستواف والمستواف	الكنافيانية وباستعماليت طيسانيد والمادية ليهرين باستديانها سيدمانها	
Environmental	This materia			nt any environmen	tal problems other than tho	se
Impact	associated w	Altii ai	i on spin.			
	{					
			,			
·						4
Precautions if Material is Released or Spilled	soon as poss absorbent c	sible, d lay, di exist	observing pred atomaceous of since these clo	cautions in Section earth or other suita	eased vapor. Clean up spills on D. Absorb large spills with able material. A fire or vapoill only absorb liquid, and w	n or
Waste Disposal	Place all cor	ntamir	nated materia	ls in disposable co	ntainers and bury in an appr	roved
Methods	dumping are	ea.				
H-Special	Presention	250				
Handling and	Keep away	from l	neat or open i	ílame.		
Storing						
		•				
A					TOI 0010401	
					TOLS010431	•
•	Ĭ					

Boiling Point (°F)	~350 - 625° F	Melting Point (*F)		Solubility  Miscible with hydrocarbons; insoluble in water.
Vapor Pressure (mm Hg & temp)		Specific Gravity (H <sub>2</sub> O = 1)	0.913-0.875 23.5-30.0 °API	Appearance, Color, Odor, etc. Pale yellow liquid
Molecular Weight		Percent Volatile by Volume (%)		Other
Vapor Density (air = 1)		Evaporation ( = 1)		Viscosity - 35 to 55 SUS @100° F

## TOLS010432

The above information is based on data available to us and is believed to be correct. However, NO WARRANTY of MERCHANTABILITY, FITNESS to any use or any other warranty is expressed or to be implied regarding the accuracy of these data, the results to be obtained from the use thereof, the hazards connected with the use of the material, or that any such use will not infringe any patent. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar, we do not assume any responsibility for the results of its use. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

836 PER-527 (OS-5-74) Product 6SJ-743

NALCO CHEMIC	2901 BUTTERFIELO ROAD : DAI
	?

Trade Name NALCO 6SJ-	743	· · · · · · · · · · · · · · · · · · ·			_ Formul	a No	
Synonyms Polyester			····	·			
	· 			_ Chemical F	amily_C	rganic	
					•	<u>.</u> .	
CTION 2 - HAZARDOUS ING	REDIENTS						
	MATERIAL (	OR COMPONE	ır			<del></del>	
Butanol							1
Toluene							
	<del></del>				······································	<del>* _ , _ , _ ,</del>	
		<del></del>					
CTION 3 – PHYSICAL PROPE	RTIES				<del> </del>	<del></del>	
Boiling Point, 760 MM HG		Meiti	ng Point			<del></del>	<del></del>
Specific Gravity (H2O=1)		Vapo	Pressure				
.952 @ 60°F		1	* * * * * * * * * * * * * * * * * * * *				
Vapor Density (Air#1)	<del></del>	Solub	IIIty In H <sub>2</sub> O,			· · · · · · · · · · · · · · · · · · ·	
% Volatiles By Vol.		6616)	Insol	.udle	M#IX	<del></del>	
				solut		6-8	
Appearance and Odor						<del> </del>	<del></del>
Park reddish-black	riquia wi	CII SI.IGI	ic arec	nor ou	<u> </u>		
CTION 4 - FLAMMABILITY	AND EXPLOS	SIVE PROP	ERTIES				<b>-</b>
Flash Point (Test Method)							
105°F PMCC Flammable Limits in Air, % By Vol.		Lower	<del></del>	<del></del>	Upper	<del></del>	
				İ	<b>-</b>		
Extinguishing Media		<del></del>	-l		<del></del>		
Foam, CO2, dry che Special Fire Fighting Procedures	emical						
		6:					
Fight as any hydro Unusual Fire and Explosion Hazard	Scarbon t	уре тте	:				
May evolve toxic	MO2 fumes	<b>;</b>					
CTION 5 - HEALTH HAZARD	DATA						,
		£	J	Deck and		-1	
Threshold Limit Value None est 50 ppm. Toluene - S	ablished kin 100 r	Ior pro	auct.	Butano	)T - 8	skin (c	eilin
Effects of Overexposure May cau	se corne	a and sk	in irr	itation	1. P1	colonge	£
inhalation may resul	t in naus	sea, hea	daches	and di	zzine	ess.	
Narcosis may develop	·		<del></del>				
MERGENCY AND FIRST AID PROCED	URES					TOLS01	0433
Eyes	En. 17	.i	. 7			<del></del> - ·	
Flush with water							
Wash with soap a	na rinse	with ble	enty of	water	•	<del></del>	
Do not induce vo	miting.	Give wat	er or	milk.	Call	a phys	icia
Remove to fresh	air.			_ *			
IRM 507 (7/75)							-

Product\_

NALCOC	2901 BUTTERFIEL
	Z

TION 6 - REACTIVITY I	ΠΔΤΔ
Stability: Stable Condition	
Unstable 421 Condition	ons to Avoid
Hazardous Decomposition Products	Unburned hydrocarbons
	Y-Y
Hazardous Polymerization: Will N	Not Occur 13.* Occur Conditions to Avoid
TION 7 - SPILL OR LEA	AK PROCEDURES
Steps to Take in Case Material is Re	eleased or Spilled Contain with absorbent material. Use
detergent and v	water to relieve slippery conditions.
Waste Disposal Method Comp	plete combustion
Waste Disposal Method	
TION 8 - SPECIAL PROT	TECTION INFORMATION
Type of Respiratory Protection Rec	quired Organic canister may be used
Ventilation: Local Exhaust 🚉 N	Mechanical (General) : Special (Specify) Other (Specify)
Protective GlovesRubbe	er Eye Protection Goggles
Other Protective Equipment Imp	pervious apron, eye wash fountains
,	
TION 9 - SPECIAL PREC	CAUTIONS
	Wandle in adequately wentileted areas. Do not
	Handle in adequately ventilated areas. Do not
store near oper	n flame.
Other Precautions <u>AVOID</u>	prolonged inhalation of fumes. Avoid eye and ski
contact. Do no	ot take internally. Launder contaminated clothin
before reuse.	-0.0040404
	TOLS010434

Similar to Form OSHA-20

EMERGENCY TELEPHONE NUMBER — (312) 332-3560

## MATERIAL SAFETY DATA SHEET

PRODUCT IDENTIF	ICATION **
MANUFACTURER SNAMES Monsanto Industrial Chemical Co	REGULAR TELEPHONE NO 314-694-1000 EMERGENCY TELEPHONE NO.
ADDRESS 800 North Lindbergh Blyd St. Louis Mis	and the second and th
TRADE NAME: Pentachlorophenol	
SYNONYMS Penta, Technical Penta, PCP	
SHIPPING A PROPERTY OF THE SHIPPING A SHIPPI	
NAME!	
A TOTAL THE STATE OF THE STATE	EDIENTS <sup>2</sup>
	CAS NO HAZARD DATA
Pentachlorophenol (and other chlorinated phenols)	29 CFR Part 1910 40 CFR Part 129
	96 40 CFR Part 129
III PHYSICAL D	ATA
BOILING POINT, 760 MM HG 310°C (Decomp.)	MELTING POINT 174°C Min.
SPECIFIC GRAVITY (H <sub>2</sub> O = 1) 1.8500 3	VAPOR PRESSURE 0.00011 mm Hg. @ 20°C
VAPOR DENSITY (AIR = 1) Nagative	SOLUBILITY IN H <sub>2</sub> O * BY WT 14 ppm @ 20°C
% VOLATILES BY VOL	EVAPORATION HATE (BUTYL ACETATE - 1)
APPEARANCE AND ODOR Chlorophenolic Odor	Ph (AS IS) Ka = 10 Ph (1% SOLN.) NA
IV FIRE AND EXPLOS	
ELASH POINT (TEST METHOD) Negative	AUTOIGNITION Negative
FLAMMABLE LIMITS IN AIR & BY VOL Negative LOWER	JPPER \
EXTINGUISHING Water Fog, Foam, CO2	
GHTING vapors given off from a fire. Us DCEOURES Blanket with extinguishing media	
TAILING LATE TO BE 2000 AND THE PERSON THE P	ires it decomposes to hydrochloric acid Chlorides and Chlorine) can be evolved
The second transfer of the second transfer of	A Commence of the Commence of

iee references 1 and 2: 2 See Instructions and references 1 to 8.

	Commence of the Commence of th	RD INFORMATION	
SHEALTH HAZARD DATA	HAZARD CLASSIFICATION	BASIS FOR CLASSIFICATION	SOURCE
ROUTES OF EXPOSURE .	TLV 0.5 mg/qu.M. Skin Notation		ACG, IH 29 CFR Part 1
SKIN CONTACT	(Mild) Sensitizer		16CFR 1500.3 (C)(5)
SKIN ABSORPTION	Toxic	200 <b>\ LD \ 1</b> 000 mg/kg	ANSI 2-129.1
EYE CONTACT	-Mild Irritant		
INGESTION	Toxic	50 <b>\</b> LD <sub>50</sub> <b>\</b> 500 mg/kg	ANSI 2-129.1 1976
CHRONIC OVEREXPOSURE	damage.  Hyperthemia, Liver, K Penta is expelled quite exposure over prolonge death.	nose, throat, eyes, respirato idney failure and death. rapidly in sub-acute doseages ed periods can lead to liver & ly eye ointment to prevent infe	and chronic kidney failure and
SULL SINGLE SOME REAL PROPERTY.	plenty of soap and water.		
	patient from source.		
	iting by drinking mustero	or salt water or finger in thr	oat. Avoid Aspiration.
otes to physician This produ	ct is a metabolic stimu <b>la</b>	nt. Causes hyperthemia trea	t symtomatically.

	VI REACTIVITY DAT	A	
Stable at temperatures \$310°C			
NCOMPATIBILITY Dissolves in alkaline solution			
HAZARDOUS DECOMPOSITION PRODUCTS  CO. CO2 FHCL and phenolics			
ONDITIONS CONTRIBUTING TO HAZARDOUS POLY			
VIIIDIS	ROSAL, SPILL OR LEAK P	ROCEDURES	
AQUATIC TOXICITY IE.G. 96 HR. TLMI			
Highly toxic to fish, especially	sensitive species suc	h as trout. Safe at	0.05 ppm in water.
NASTE DISPOSAL METHOD Disposal must be carried out in	a accordance with loca	l, state, and Fede	ral regulations.
Do not incinerate closed contain or bodies of water. Bury in sa	ners. Do not dispose	near water drainag	je to stream .
STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR  Wet down spilled material to position to the manner. Avoid contact, avoid neutralizing chemicals  None.	revent dusting and swe	ep up and dispose	in approved
VIII SI	PECIAL PROTECTION INF	ORMATION	
VENTILATION REQUIREMENTS  Not required in storage areas.  Maintain level belows the TLV.	In work areas use so	lvent type dust coll	ectors.
SPECIFIC PERSONAL PROTECTIVE EQUIPMENT (1) Rubber Gloves, Chemical Gogg ERESPIRATORY SPECIFY IN DETAILS Bureau of Mines approved resp		roved organic vapo	r and particulate m
EYE  *** Chemical Goggles			
JigLoves ( Neoprene ( )			
OTHER CLOTHING AND EQUIPMENT Clean clothing fully covering b Discard contaminated shoes.	ody changed at least d	aily if in contact w	ith penta.

ECAUTIONARY IX SPECIAL PRECAUTIONS	
ATEMENTS Keep out of reach of children. Avoid prolonged and/or repeated bre	
The state of the s	
THER HANDLING AND A CONTROL OF THE PROPERTY OF	
Store in closed properly labeled containers.	
Do not reuse containers. Drums should be returned to drum recond to be stored on the stored of the s	
AN SOURTH Weather, Shelf life indefinite under good storage conditions.	
DDITIONAL REGULATORY CONCERNS	
FDA	
C USDA CO	
CPSC	
TSCA, IS THIS PRODUCT, OR ALL'ITS INGREDIENTS: BEING CERTIFIED FOR INCLUSION ON THE TOXIC SUBSTANCE IN INVENTORY OF CHEMICAL SUBSTANCES? As a registered pesticide, this product ex	LONTRUE ACT
OTHER EPA FIFRA	
STATE Water quality, Air quality and Health Departments in some states.	
PREPARED BY TO M. Montgomery	
TITLE General Sales Manager	
COMPANY Koppers Company, Inc.  \$200RESS 5137 Southwest Avenue	
St. Louis, Missouri 63110	LS010438

# U.S. DEPARTMENT OF LABOR 25 Occupational Safety and Health Administration MATERIAL SAFETY DATA SHEET

MANUFACTURER'S NAMES Charter International 011 Compa			EMERGENCY TELEPHONE AC 713 / 923-1651	NO.	
ADDRESS (Number, Street, City, State, and ZIP Cooper TX 77	<i>1e)</i>		Medical Emergency AC 713 / 225-0463	No.	
CHEMICAL NAME AND SYNONYMS	g i	<b>47029</b> 3	TRADE NAME AND SYNONYMS Espesol 310-66 (Short Ra	nge	Mineral
HEMICAL FAMILY AND HYDROCARDON	20 1		FORMULA CONTROL OF THE CONTROL OF TH		pirins)
Participation of the contraction	240	NUAZAD	POUL INCREDIENTS		
PAINTS, PRESERVATIVES, & SOLVENTS	11 37 12.33	TLV K	RDOUS INGREDIENTS		TLV
	*	(Units)	ALLOYS AND METALLIC COATINGS	×	(Units)
PIGMENTS	128	<b>美術家</b>	BASE METAL		- <i> </i>
CATALYST		A SATE	ALLOYS WAS AND TO THE STATE OF	-	,
VEHICLE			METALLIC COATINGS		1 22 2
SOLVENTS Espesol 310-66	100	<del></del>	FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES		<b>多</b>	OTHERS	1	
OTHERS		1000		<u>                                     </u>	
HAZARDOUS MIXTURES	OF (	THER LIC	QUIDS, SOLIDS, OR GASES	×	(Units)
的一种,但是一种,是一种的一种,是一种的一种,但是一种的一种的一种。		建设建设金	<b>等数的表现</b> 。不同的数数数据等的的。		
为了一个人的人,不是一个人的人的人。 第一个人的人的人的人的人的人的人的人的人的人的人的人的人的人的人的人的人的人的人的	6- J975	Signal St			
				7	7
THE REPORT OF THE PARTY OF THE		4.25			
SEC .					
BOILING POINT (°F.) ASTM D-86°F	TIO		SPECIFIC GRAVITY (H20-1)	0.	7669
SEC .	710 31 2	N III ; P 0/347 0/8-5	SPECIFIC GRAVITY (H20-1)  PERCENT, VOLATILE BY VOLUME (%)	0.	
BOILING POINT (°F.) ASTM D-86°F	31 2	N III ; P 0/347	SPECIFIC GRAVITY (H20-1)		07
SEC  BOILING POINT (°F.) ASTM D-86°F  VAPOR PRESSURE (mm Hg.) 0600°F/100°F  VAPOR DENSITY (AIR=1)	31 2 4.	N III , F 0/347 0/8.5 73	PHYSICAL DATA  SPECIFIC GRAVITY (H20=1)  PERCENT, VOLATILE BY VOLUME (%)  EVAPORATION RATE (	10	07
SEC  BOILING POINT (°F.) ASTM D-86°F  VAPOR PRESSURE (mm Hg.) 0600F / 100°F  VAPOR DENSITY (AIR-1)	31 2 4.	N III , F 0/347 0/8.5 73	PHYSICAL DATA  SPECIFIC GRAVITY (H20=1)  PERCENT, VOLATILE BY VOLUME (%)  EVAPORATION RATE (	10	07
SEC  BOILING POINT (°F.) ASTM D-86°F  VAPOR PRESSURE (mm Hg.) (600F/100°F  VAPOR DENSITY (AIR-1)  SOLUBILITY IN WATER  APPEARANCE AND OOOR WATER White I	TIO 31 2. 4. Ne	N III F 0/347 0/8 5 73 gligibl id; mil	PHYSICAL DATA  SPECIFIC GRAVITY (H20-1)  PERCENT, VOLATILE BY VOLUME (%)  EVAPORATION RATE (	10	07
SEC  BOILING POINT (°F.) ASTM D-86°F  VAPOR PRESSURE (mm Hg.) 0600F / 100°F  VAPOR DENSITY (AIR: 1)  SOLUBILITY IN WATER  APPEARANCE AND OOOR WATER White L  SECTION IV	TIO 31 2. 4. Ne	N III F 0/347 0/8 5 73 gligibl id; mil	PHYSICAL DATA  SPECIFIC GRAVITY (H20-1)  PERCENT, VOLATILE BY VOLUME (%)  EVAPORATION RATE (	10	07
SEC  BOILING POINT (°F.) ASTM D-86°F  VAPOR PRESSURE (mm Hg.) G600F/100°F  VAPOR DENSITY (AIR-1)  SOLUBILITY IN WATER  APPEARANCE AND ODOR WATER White I  SECTION IV  FLASH POINT (Method used)  TCC. °F 100°	31 2. 4. Ne lqu	N III F 0/347 0/8.5 73 gligibl id; mil	PHYSICAL DATA  SPECIFIC GRAVITY (H10-1)  PERCENT, VOLATILE 8V VOLUME (%)  EVAPORATION RATE (	100	0 <b>%</b> 22
SEC  BOILING POINT (°F.) ASTM D-86°F  VAPOR PRESSURE (mm Hg.) (6600F/100°F  VAPOR DENSITY (AIR=1)  SOLUBILITY IN WATER  APPEARANCE AND OOOR Water White I  SECTION IV  FLASH POINT (Method used)  TCC. °F 100°	31 2. 4. Ne lqu	N III F 0/347 0/8.5 73 gligibl id; mil	PHYSICAL DATA  SPECIFIC GRAVITY (H10-1)  PERCENT, VOLATILE 8V VOLUME (%)  EVAPORATION RATE (	100	0 <b>Z</b> 22
SEC  BOILING POINT (°F.) ASTM D-86°F  VAPOR PRESSURE (mm Hg.) 0600F / 100°F  VAPOR DENSITY (AIR: 1)  SOLUBILITY IN WATER  APPEARANCE AND OOOR WATER White L  SECTION IV	31 2 4. Ne siqu	NIII F 0/347 0/8.5 73 gligibl id; mil EAND E	PHYSICAL DATA  SPECIFIC GRAVITY (H <sub>2</sub> O-1)  PERCENT, VOLATILE BV VOLUME (%)  EVAPORATION RATE (	0.	0 <b>Z</b> 22

200	SECTION VEHEALTH HAZARD DATA
0	THRESHOLD LIMIT VALUE 100 ppm (ACGIH)
	to vapor might affect central nervous system and cause respiratory irritation.
Ì	EMERGENCY AND FIRST AID PROCEDURES AND AND AND AND AND AND AND AND AND AND
S	cial. Eve contact Wash with plenty of water for five minutes. Inhalation -
	Provide fresh air and rest. *Ingestion: Do no induce vomiting; call a physician.
2	SECTION VIE REACTIVITY DATA
	UNSTABLE CONDITIONS TO AVOID
	STABLE
L	INCOMPATABILITY (Materials to avoid) Avoid strond oxidizing agents.
	Carbon monoxide is burned with insufficient air.
	HAZARDOUS POLYMERIZATION  MAY OCCUR
	WILL NOT OCCUR
L	
r	and the first the second of the properties of the first the first the second of the first the fi
3	SECTION VII - SPILL OR LEAK PROCEDURES
	SECTION VII - SPILL OR LEAK PROCEDURES  STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED  Avoid open flame. Provide adequate ventilation. Collect and dispose of all
	STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
	STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled liquid.
	STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled liquid.  WASTE DISPOSAL METHOD: Use the same precautions for disposal as you would for kerosene. Espesol 310-66
	Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled liquid.
	Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled liquid.  WASTE DISPOSAL METHOD Use the same precautions for disposal as you would for kerosene. Espesol 310-66  (Mineral Spirits) is a combustible hydrocarbon and will burn if ignited.
	Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled liquid.  WASTE DISPOSAL METHOD Use the same precautions for disposal as you would for kerosene. Espesol 310-66  (Mineral Spirits) is a combustible hydrocarbon and will burn if ignited.
	Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled liquid.  WASTE DISPOSAL METHOD Use the same precautions for disposal as you would for kerosene. Espesol 310-66  (Mineral Spirits) is a combustible hydrocarbon and will burn if ignited.
	Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled liquid.  WASTE DISPOSAL METHOD Use the same precautions for disposal as you would for kerosene. Espesol 310-66  (Mineral Spirits) is a combustible hydrocarbon and will burn if ignited.  SECTION VIII. SPECIAL PROTECTION INFORMATION
	SECTION VIII SPECIAL PROTECTION INFORMATION  RESPIRATORY PROTECTION (Specify type)  In inadequately ventilated space, use self-contained breathing apparatus ventilation it Local Exhaust  Local Exhautt  Local Exhaust  Local Exhaust  Local Exhaust  Local Exhaust
	SECTION VIII SPECIAL PROTECTION INFORMATION  RESPIRATORY PROTECTION (Specify type) In inadequately ventilated space, use self-contained breathing apparatus ventilation is a fire-safe area.  MECHANICAL (General)  Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled.  Collect and dispose of all spilled.  Collect and dispose of all spilled.  Section VIII Special as you would for kerosene, Espesol 310-66  (Mineral Spirits) is a combustible hydrocarbon and will burn if ignited.  Section VIII Special PROTECTION INFORMATION  RESPIRATORY PROTECTION (Specify type)  In inadequately ventilated space, use self-contained breathing apparatus.  Special Special OTHER
	STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled liquid.  WASTE DISPOSAL METHOD Use the same precautions for disposal as you would for kerosene. Espesol, 110-66  (Mineral Spirits) is a combustible hydrocarbon and will burn if ignited.  SECTION VIII - SPECIAL PROTECTION INFORMATION  RESPIRATORY PROTECTION (Specify type) In inadequately ventilated space, use self-contained breathing apparatus.  VENTILATION   LOCAL EXHAUST   To a fire-safe area   MECHANICAL (General)   OTHER  PROTECTIVE GLOVES   MECHANICAL (General)   Recommended   Recom
	STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled liquid.  WASTE DISPOSAL METHOD USE the same precautions for disposal as you would for kerosene. Espesol 310-66  (Mineral Spirits) is a combustible hydrocarbon and will burn if ignited.  SECTION VIII. SPECIAL PROTECTION INFORMATION  RESPIRATORY PROTECTION (Specify type) In inadequately ventilated space, use self-contained breathing apparatus VENTILATION COCAL EXHAUST To a fire-safe area.  MECHANICAL (General)  PROTECTIVE GLOVES Recommended.  OTHER PROTECTIVE EQUIPMENT As required to avoid wetting clothes.
	SECTION VIII - SPECIAL PROTECTION INFORMATION  RESPIRATORY PROTECTION   Specify type  In inadequately ventilated space, use self-contained breathing apparatus.  Ventilation   Local exhaust   To a fire-safe area.  MECHANICAL   General   PROTECTION   Recommended.  REVERROTECTION   Recommended.

PAGE (2)

Form OSHA-20 Rev. May 72

WAGE AND LABOR STANDARDS ADMINISTRATION

## MATERIAL SAFETY DATA SHEET

A PARTY OF THE PAR					
		SECT	ION 1 6/2/75		13. 4-14-
MANUFACTURER'S NAME Union Oil Company of California ADURESS (Number, Street, City, State, and ZIP Code Union Oil Center, 461 So. Boylst	1. A - 2. A	A Direction	LMERGENCY TELEPHONE NO		
CHEMICAL NAME AND SYNONYMS N. A.	on A	ive., Lo	TRADE NAME AND SYNONYMS		
N. A.  CHEMICAL FAMILY  Ilydrocarbon			FORMULA Petroleum Wax		t mast stranger at the second
llydrocarbon					
The state of the s			IDOUS INGREDIENTS		
PAINTS, PRESERVATIVES, & SOLVENTS	*	TLY (Units)	ALLOYS AND METALLIC COATI35	%	TLV (Units)
PIGMENTS	灣	(Xalla)	BASE METAL	7.7	
CATALYST		(1) (1) (1) (1) (1) (1) (1) (1)	ALLOYS (1987) TO SEE THE SEE T		
VEHICLE	1.3		METALLIC COATINGS		
SOLVENTS	.51.		FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES	\-\frac{1}{2}.		OTHERS		
OTHERS	i je				
HAZARDOUS MIXTURES	OF O	THER LIQ	UIDS, SOLIDS, OR GASES	7	TLY (Units)
Product not hazardous as defined		Sootia	20 1501 2 1502 2		7.00
1503.2 of the Code of Federal Re	3.0		The state of the s		
					!
		J. 1148 (14.)	and the state of t		e Sp. see
			andre sessional de la company de la company de la company de la company de la company de la company de la comp	. ;	35 - 4
grant and the second assistance SEC	~		HYSICAL DATA	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
BOILING POINT (F.)	ove	er 600°	SPECIFIC GRAVITY (H20=1)		0.9
VAPOR PRESSURE (mm Hg.)	1	A. 3.2	PERCENT VOLATILE		N. A.
VAPOR DENSITY (AIR=1)	N.	A	EVAPORATION RATE (2005) STORES (400)		N. A.
SOLUBILITY IN WATER		oluble	- 一年を大きない。 学術機能は対するとなった。		
APPEARANCE AND ODOR Water-white. o	dor	less 📆		<u> </u>	. 14. <b>3.</b> 11. 1
na samu ang sa 1971 dan samanah samunah bang at pendahan aning 1996 pada an amataban Tanggaran			nan menden an <u>t in ter</u> pana pana mang pant mang berapatan panahan berapatan		
SECTION IV				···	- Allege Salas
LASH POINT (Method used) 490°F typical ASTN D 92 COC F1	ash.	Point	Ν. Λ.	<u> </u>	Uel
EXTINGUISHING MEDIA FOOM, Carbon Dioxide, Dry Chemic FICIAL FIRE FIGHTING PROCEDURES None	al.	Vapor1	zing Liquid Type Extinguishers	क्षीद्वादन 	ere de la composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della co
				.S0	10441
UNUSUAL FIRE AND EXPLOSION HAZAROS	inal	ion wi	th paper, cloth, or wood wastes	V. 1	
			the proportion of the configuration of the same the same of the sa		MOOTO S

TOXICOLOGICAL & HANDLINGS	<b>一种</b>
PETROLEUW	
Edwin Cooper, Inc. 17:00 South Second Street	
St. Louis, Missouri, 63104 :	
HITEC E515	
2. Chemical Cand Physical Properties:	
(a) Specific gravity	
NA NA STATE OF STATE	
e) Water solubility Practically insoluble	
f) Hazardous polymerization □ Yes □ No g) Stable □ No	
h) Shock sensitive ☐ Yes 🔯 No	
3.3. Physiological Properties:	
a) Acute oral toxicity (LD50 if available): Oral MLD (rats) 25000-30,000 mg/Kg	
	، ' <b>ل</b> راها
c) Local effects on skin: Slight irritant	
d) Absorption through skin: MLD (rabbits) 35-40,000 mg/Kg.	
e) \inhalation effects (vapors/or dust): NA	
4. First Aid Treatment:	
( a) Skin contact: Wash thoroughly with soap and water.	au Au
b) Eye contact: Prlush with copious quantities of water and	
c) ingestion: Induce vomiting and consult physician immediately.	
5. Protective Equipment:	
Normal usage requires: Gloves and protective face shield or goggles	
NAME: David & Park	
TITLE: Plant Chemist DATE: 7/27/72	
Classification	
TOI S0104	42

# Environmental Health & Toxicology



Warning Statement		Name
DANGER!	HARMFUL OR FATAL IF SWALLOWED COMBUSTIBLE	CHEVRON 325 SOLVENT
A-Typical	Composition	

A-Typical Composition	
	%
Paraffins (incl. naphthenes)	96%
Aromatics C <sub>8</sub> +	4%

Threshold Limit Value (TLV)	The suggested TLV is 250 ppm (Parts of vapor per million parts of air) for a daily 8-hour exposure. No OSHA exposure standard has been established for this material.				
Eye Irritation	This material is not a primary eye irritant. However, minor irritation may be noted following contact. Application of the material into the eyes of rabbits produced a slight degree of membrane irritation.				
Skin Irritation	This material may cause skin irritation on prolonged or frequently repeated contact. Application of the material onto the skin of rabbits produced a moderate degree of erythema and edema. The primary irritation score was 3.7 on a scale of 0 to 8. Prolonged or frequently repeated skin contact may cause the skin be become dry or cracked from the defatting action of the material.				
Systemic Effects	From the results of animal studies, this material is not expected to be toxic by ingestion or by skin contact. The acute oral LD $_{50}$ for rats was greater than 15.3 g/Kg, and the acute dermal LD $_{50}$ for rabbits was greater than 19.1 g/Kg.				
	Prolonged exposure to high vapor concentrations of this material may cause signs and symptoms of central nervous system depression such as, headache, dizziness, loss of appetite, weakness, and loss of coordination. Affected persons normally experience complete recovery when removed from the exposure area. Aspiration of the liquid can lead to chemical pneumonitis.				
	TOLS010443				

Note Disclaimer of Warranty, Page 4

(Approved by U.S. Department of Labor, "Essentially similar to Form OSHA 20, Material Safety Data Sheet")
Rev. No. 47 : 1978

Eye Contact	Flush eyes with fresh water for at least 15 minutes. If irritation persists get medical attention.
Skin Contact	Use good personal hygiene practices while working with this material. Wash contaminated clothing before reuse.
Inhalation	If there are signs or symptoms of overexposure to mist or vapor of this material (as described in Section B - Systemic Effects), move the individual to an uncontaminated area. If breathing has stopped, apply artificial respiration. Get medical attention immediately.
Ingestion	If this material is swallowed and aspirated, chemical pneumonitis may result. If swallowed, DO NOT induce vomiting; get medical attention immediately.

D-Special Protection Information					
Eye Protection	Avoid eye contact with this material. If the conditions or frequency of use increase the danger of exposure, eye contact can best be avoided by wearing chemical-safety goggles.				
Respiratory Protection	The vapor or mist concentrations of this material must be kept below applicable standards (see Section B - TLV). If this cannot be achieved, the use of an approved respirator for organic vapor and mist, supplied-air or self-contained breathing equipment is recommended.				
Skin Protection	Avoid prolonged or frequently repeated skin contact with this material. If the conditions or frequency of use increase the danger of exposure, skin contact can best be avoided by wearing impervious neoprene or rubber gloves.				
Ventilation	Use adequate ventilation to keep the vapor or mist concentrations of this material below applicable standards.				
Other	If eye or skin contact with this material can occur, washing facilities for eyes and skin should be available nearby.				

E-Fire Pr	E-Fire Protection Information						
Flash Point (test method)	(TCC)100°F	Flammable Limits (by volume in air)	lower limit		upper limit		
Autoignition Temperature	610 <sup>o</sup> F	Extinouishing	CO <sub>2</sub> , Dry Ch	emical, Foam,	Water Spray		
Special Fire Fighting Procedures	without prop	lving this material, er protective equiporotect against the ficiency. Read the	nent. This ma hazardous effe	y include self- cts of normal	contained bro	eathing	

of thinners and solvents in work situations where the material would be release into the atmosphere. Air pollution regulations should be studied to determine if this material is exempt in that area where it is to be used.  Eliminate all sources of ignition in vicinity of spill or released vapor. Clean up spills as soon as possible, observing precautions in Section D. Absorb large spil with absorbent clay, diatomaceous earth or other suitable material. A fire or vapor hazard may exist since these cleanup materials will only absorb liquids an will not absorb the vapor.  Waste Disposal Methods  Place contaminated material in disposable containers and bury in an approved dumping area.  H-Special Precautions  Handling and										
Stability thermal, light, etc.)  Incompatibility materials to avoid)  May react with strong oxidizing materials.  May react with strong oxidizing materials.  May occur Conditions to Avoid  May Occur Will not Occur X to Avoid  G-Environmental Protection  Environmental Impact  Certain geographical areas have air pollution restrictions concerning the use of thinners and solvents in work situations where the material would be release into the atmosphere. Air pollution regulations should be studied to determine if this material is exempt in that area where it is to be used.  Precautions if Material is Released or Spilled  Precautions if Material is Released or Spilled  Waste Disposal Waste Disposal Methods  Place contaminated material in disposable containers and bury in an approved dumping area.  Place contaminated material in disposable containers and bury in an approved dumping area.  READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL Keep away from heat or open flame.	vity Data									
thermal, light, etc.) Incompatibility materials to avoid)  May react with strong oxidizing materials.  May occur Conditions Products  May occur Will not Occur X  G-Environmental Protection  Environmental material in disposable containers and bury in an approved dumping area.  Precautions if Material Septings  May occur Will not Occur X  G-Environmental Protection  Certain geographical areas have air pollution restrictions concerning the use of thinners and solvents in work situations where the material would be release into the atmosphere. Air pollution regulations should be studied to determine if this material is exempt in that area where it is to be used.  Eliminate all sources of ignition in vicinity of spill or released vapor. Clean up spills as soon as possible, observing precautions in Section D. Absorbe large spill with absorbent clay, diatomaceous earth or other suitable material. A fire or vapor hazard may exist since these cleanup materials will only absorb liquids as will not absorb the vapor.  Place contaminated material in disposable containers and bury in an approved dumping area.  H-Special Precautions  READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL Keep away from heat or open flame.	Stable . X Conditions									
May react with strong oxidizing materials.    Hazardous   Decomposition   Normal combustion forms carbon dioxide and water vapor; incomplete combucan products arbon monoxide.    Hazardous   Polymerization   May Occur   Vill not Occur   X   To Avoid	L									
May react with strong oxidizing materials.    Hazardous   Decomposition   Normal combustion forms carbon dioxide and water vapor; incomplete combucan products arbon monoxide.    Hazardous   Polymerization   May Occur   Vill not Occur   X   To Avoid		1								
Products    Hazardous	May react with strong oxidizing	May react with strong oxidizing materials.								
Precautions if Material is Released or Spilled  Beliamsed Disposal Methods  Will not Occur X  To Avoid  To	1,									
G-Environmental Protection  Environmental Impact  Certain geographical areas have air pollution restrictions concerning the use of thinners and solvents in work situations where the material would be release into the atmosphere. Air pollution regulations should be studied to determine if this material is exempt in that area where it is to be used.  Eliminate all sources of ignition in vicinity of spill or released vapor. Clean up spills as soon as possible, observing precautions in Section D. Absorb large spill with absorbent clay, diatomaceous earth or other suitable material. A fire or vapor hazard may exist since these cleanup materials will only absorb liquids as will not absorb the vapor.  Waste Disposal Methods  Place contaminated material in disposable containers and bury in an approved dumping area.  H-Special Precautions  READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL  Keep away from heat or open flame.	may occur									
Environmental Impact  Certain geographical areas have air pollution restrictions concerning the use of thinners and solvents in work situations where the material would be release into the atmosphere. Air pollution regulations should be studied to determine if this material is exempt in that area where it is to be used.  Precautions if Material is Released or Spilled  Eliminate all sources of ignition in vicinity of spill or released vapor. Clean up spills as soon as possible, observing precautions in Section D. Absorb large spill with absorbent clay, diatomaceous earth or other suitable material. A fire or vapor hazard may exist since these cleanup materials will only absorb liquids as will not absorb the vapor.  Waste Disposal Methods  Place contaminated material in disposable containers and bury in an approved dumping area.  H-Special Precautions  READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL  Keep away from heat or open flame.										
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vapor hazard may exist since these cleanup materials will only absorb liquids as will not absorb the vapor.  Waste Disposal Methods  Place contaminated material in disposable containers and bury in an approved dumping area.  H-Special Precautions  Handling and Storing  READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL  Keep away from heat or open flame.	spills as soon as possible, obse	rving precautions in Section D. Absorb large spills								
Waste Disposal Methods  Place contaminated material in disposable containers and bury in an approved dumping area.  H-Special Precautions  Handling and Storing  READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL  Keep away from heat or open flame.	vapor hazard may exist since									
Handling and Storing READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL  Keep away from heat or open flame.	Place contaminated material i	n disposable containers and bury in an approved								
Handling and Storing READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL  Keep away from heat or open flame.										
Handling and Storing READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL Keep away from heat or open flame.	al Procautions	,								
Storing READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL  Keep away from heat or open flame.	ir recautions									
Keep away from heat or open flame. KEEP OUT OF REACH OF CHILDREN.	READ AND OBSERVE	PRECAUTIONS ON PRODUCT LABEL								
KEEP OUT OF REACH OF CHILDREN.	Van august fram									
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(C)

I-Physica	l Proper	ties		
Boiling Point (*F)	302-370°F	Melting Point (°F)		Solubility  Miscible with hydrocarbons; insoluble in water.
Vapor Pressure (mm Hg & temp)	6 mm Hg @ 100 <sup>0</sup> F	Specific Gravity (H <sub>2</sub> O = 1)	0.78	Appearance, Color, Odor, etc.  Colorless liquid
Molecular Weight	139 (avg.)	Percent Volatile by Volume (%)	99%+	Other
Vapor Density (air = 1)	4.8	Evaporation ( BuAc = 1)	0.24	Viscosity – <32 SUS @ 77°F

above information is based on data available to us and is believed to be correct. However, NO WARRANTY of MERCHANTABILITY, FITNESS for any use or any other warranty is expressed or to be implied regarding the accuracy of these data, the results to be obtained from the use thereof, the hazards connected with the use of the material, or that any such use will not infringe any patent. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar, we do not assume any responsibility for the results of its use. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

### U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration

Form Approved OMB No. 44-R1387

## MATERIAL SAFETY DATA SHEET

		SECT	ION I			
MANUFACTURER'S NAME REICHHOLD CHEMICALS, INC. (206) 572-5600					NE NO.	
DORESS (Number, Street, City, State, and ZIP Co	•	2340 Ta	ylor Way (P. O. Box 1482), Tacoma, Wa	9840	 )1	
HEMICAL NAME AND SYNONYMS	roph	enol	TRADE NAME AND SYNONYMS			
CHEMICAL FAMILY Chlorinated phenols FORMULA C <sub>6</sub> Cl <sub>5</sub> OH						
SECTION	111 -	HAZAF	RDOUS INGREDIENTS	<del></del>	<del></del>	
PAINTS, PRESERVATIVES, & SOLVENTS		TLV (Units)	ALLOYS AND METALLIC COATINGS		TLV (Units)	
IGMENTS			BASE METAL			
ATALYST			ALLOYS			
EHICLE			METALLIC COATINGS			
OLVENTS .			FILLER METAL PLUS COATING OR CORE FLUX			
DDITIVES	T		OTHERS			
THERS						
HAZARDOUS MIXTURE	S OF	OTHER LIC	DUIDS, SOLIDS, OR GASES	*	TLV (Units)	
	,					
SEC	TIO	N 111 - F	PHYSICAL DATA			
OILING POINT (°F.) 309° C.	1	54° F.	SPECIFIC GRAVITY (H2O=1)		1.86@25* (	
APOR PRESSURE (mm Hg.) 0.00011 20° C. (68° F.)		PERCENT, VOLATILE BY VOLUME (%)		Negative		
VAPOR DENSITY (AIR=1)		EVAPORATION RATE		Negative		
OLUBILITY IN WATER 14 ppm	LITY IN WATER 14 ppm at 68° F.				<u> </u>	
		or solid	blocks Buff colored			
SECTION IV -	FIR	E AND I	EXPLOSION HAZARD DATA			
FLASH POINT (Method used) >300° C. Tagged closed cup						
XTINGUISHING MEDIA Foam, water			cid e			
PECIAL FIRE FIGHTING PROCEDURES				<b>~</b> ! ~	0104	

UNUSUAL FIRE AND EXPLOSION HAZARDS

When subjected to high temperatures, decomposes. Decomposed products are acidic and corrosive. Volatile in steam.

PAGE (1)

(Continued on reverse side)

Form OSHA-20 Rev. May 72

		SECTION	VV · HEAL	LTH HAZARD	DATA		
THRESHOLD LIMI	TVALUE	LD.~	29 mg/Kg m	ian, LD <sub>50</sub> ~	146 mg/Kg Rats.		
EFFECTS OF OVE	REXPOSURE	Acute poi	isoning is m	arked by weakn	ess, convulsion and collapse.		
EMERCENCY AND	FIRST AID PROCE	FOURER		·			
EXTERNAL:	Eyes_Immedia	tely flush			clear water until physician arrives.		
Skin-Remove co	entaminated clot	hing; wash	with copious	amounts of soap	and water. INTERNAL: Call a physicia		
or poison Contro	ol Center immedi	ately. CO	NTAMINATE	D CLOTHING: 1	horoughly wash before re-use.		
	· · · · · · · · · · · · · · · · · · ·	SECTI	ON VI - RI	EACTIVITY DA	ATA		
STABILITY	UNSTABLE		CONDITION	S TO AVOID	ratures: evaid exposure to		
	STABLE	TABLE V		Decomposes at high temperatures; avoid exposure to temperatures above 300° C.			
INCOMPATABILIT	Y (Materials to avoi						
HAZARDOUS DEC	OMPOSITION PRO	DUCTS		alkaline solution:			
	<del></del>		Acid fumes co	ntaining organic			
HAZARDOUS POLYMERIZATION	MAY OC	CUR					
		T OCCUR	X				
	EN IN CASE MATI						
Wet dow Sweep u	n spilled mater p and put back	rial to pre	vent dusting				
Sweep u	n spilled mater p and put back  METHOD	rial to pre-	vent dusting ainer.				
Sweep u	n spilled mater p and put back	rial to pre-	vent dusting ainer.				
Sweep u	n spilled mater p and put back  METHOD  chemical dispo	into cont	vent dusting ainer. and cover w		NFORMATION		
Wet dow Sweep u waste disposal Take to	n spilled mater p and put back  METHOD  chemical dispo	into control	ainer.  and cover w	ith dirt.			
Wet dow Sweep u  WASTE DISPOSAL  Take to	n spilled mater p and put back  METHOD  chemical dispo	into control  osal area  ON VIII -  (v. type)	ainer.  and cover w	ith dirt.	NFORMATION or dust and vapors.		
Sweep u	m spilled mater p and put back  METHOD  chemical dispo	into control  osal area  ON VIII -  (y type)  y type)  Wec	ainer.  and cover w  SPECIAL P	ith dirt.  ROTECTION II	or dust and vapors.  SPECIAL  OTHER		
Wet dow Sweep u  WASTE DISPOSAL  Take to  RESPIRATORY PR  VENTILATION	SECTION (Specific LOCAL EXHAL	into control  osal area  ON VIII -  (y type)  y type)  Wec	ainer.  and cover w	ith dirt.  ROTECTION II	or dust and vapors.  SPECIAL  OTHER Full sefety geggles recommended.		
Wet dow Sweep u  WASTE DISPOSAL  Take to  RESPIRATORY PR  VENTILATION  PROTECTIVE GLO	SECTION (Specification)  LOCAL EXHAUMECHANICAL	into control  osal area  ON VIII -  (y type)  y type)  Wec	ainer.  and cover w  SPECIAL P	ith dirt.  ROTECTION II ing respirator for	or dust and vapors.  SPECIAL  OTHER Full sefety geggles recommended.		
Wet dow Sweep u  WASTE DISPOSAL  Take to  RESPIRATORY PR  VENTILATION  PROTECTIVE GLO	SECTION (Specification)  LOCAL EXHAUMECHANICAL	into control  osal area  ON VIII -  (y type)  y type)  Wec	ainer.  and cover w  SPECIAL P	ith dirt.  ROTECTION II ing respirator for	or dust and vapors.  SPECIAL  OTHER Full sefety geggles recommended.		
Wat dow Sweep u  WASTE DISPOSAL  Take to  RESPIRATORY PR  VENTILATION  PROTECTIVE GLO	SECTION (Specification)  LOCAL EXHAUMECHANICAL	into control osal area of the control osal are	vent dusting ainer.  and cover w  SPECIAL P  or air purifyi	ith dirt.  ROTECTION II ing respirator for	OF dust and vapors.  SPECIAL  OTHER Full sefety geggles recommended.		
Wet dow Sweep u  WASTE DISPOSAL  Take to  RESPIRATORY PR  VENTILATION  PROTECTIVE GLO  OTHER PROTECTI	SECTION (Specific LOCAL EXHALL MECHANICAL EQUIPMENT	into control osal area  ON VIII - (y type) Vec UST (General) Ru	sent dusting ainer.  and cover w  SPECIAL P  or air purifyither gloves  NIX - SPECIAL STORING	ROTECTION II ing respirator for required. EYE PROTECTIO	or dust and vapors.  SPECIAL  OTHER Full selety geggles recommended.  N		
Wat dow Sweep u  WASTE DISPOSAL  Take to	SECTION (Specific LOCAL EXHALL MECHANICAL EQUIPMENT	into control osal area  ON VIII - (y type) Vec UST (General) Ru	went dusting ainer.  and cover w  SPECIAL P  or air purifying  bber gloves  N IX - SPECIAL STORING	ROTECTION II  ing respirator for  required.  EYE PROTECTIO  CIAL PRECAU	or dust and vapors.  SPECIAL  OTHER Full sefety geggles recommended.  N  TIONS		

PAGE (2)

Form OSHA-20

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COVER EXPLOSES			
Çly%20;;:]972.%		17112 (E. 1150) (E. 1150)	
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EMEMICALITATION COUNTY	bruiggard, St. L	Missouri 63166 MONSA TO HEAVY	15 (1) (2) (2) (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4
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OXO ALEOHOD HIGH			
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PAIKIS PREJESTALITES &	OCVENTS TO	ALLOYS AND METALLIC COATING	TLV (Unite)
PIGMINIST	(Units)	BASE METAL	
CATALYST	TO STATE OF THE	ALLOYS	
VEHICLE -		METALLIC COATINGS	
SOLVENTS		FILLER METAL PLUS COATING OR COTE FLUX	A 400
ADDITIVES *	AND THE CASE	OTHERS.	
LOTHERS	( <b>自然</b> )对公		
HAZARDO	US HIXTURES OF OTHER LI	UIDS, SOLIDS, OR GASES	% (linux)
A CONTRACTOR OF THE CONTRACTOR			
	SECTION III	COPHYSICAL DATA	THE STREET
BOILING POINT CF 12 @ 20 mm		SPECIFIC GRAVITY IH20#11 @ 25/2	
VAPOR PRESSURE INVINE NO. 1	<0.1	PERCENT VOLATILE	NA
VAPOR OFNSITY (AIR-1)	NA	EVAPORATION RATE	< 1
APPLANANCE AND ODDR CLOS		13 603 3 61 6 603 1 61	ristic odor
THE PERSON NAMED AND ADDRESS OF THE PERSON NAMED AND ADDRESS O	CONTRACTOR DE LA CONTRA	THE PROPERTY OF THE PROPERTY O	Machine Commence of the Commen
SECTIO	N IV FIRE ANI	EXPLOSION HAZARD DATA	i Premia Regional
FLASH POINT (Aleiting used) CO	C - 305°F	FLAMMABLE LIMITS	Lei Ual
Dry	powder, CO2, Fo	oam, Foq	
I SPECIAL FIRE FIGHTING PROCEDURE			
HUSUAL FIRE AND EXPLOSION HA			· · · · · · · · · · · · · · · · · · ·
		andre de la companya de la companya de la companya de la companya de la companya de la companya de la companya	i.
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	SECTIONAL SHEALTHSHAZARD DATA TO THE
PARESHOLD INTEVAL	
ILLCIS OF OVEREXPOS	URI
IMERGENLY AND FIRST	AID PROCEDURES
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The state of the s	
	SECTION VI REACTIVITY DATA
JABILLY STATE	UNSTABLE TO AVOID TO AVOID
<b>2000年</b> 0月	STADIO TO THE EX
INCOMPATABLETY (Mass	Strong oxidizing agents
	ITION PRODUCTS
HAZAROOUS ***	MAY OCCUR
POLYMERIZATION	
	SECTION VII SPILL OR LEAK PROCEDURES
sites to the letter in Adsort	CASE MATERIAL IS RELEASED ON SPILLED CON Clay Sawdust or filter-cel
WASTE DISPOSAL METH	00.
	or dispose of in sanitary landfill according to local regulations.
	SECTION VIII SPECIAL PROTECTION INFORMATION
MESPIRATORY PROTECTI	On (Specify tipe)
VENTILATION	LOCAL EXHAUST
	MECHANICAL (General)
PROTECTIVE GLOVES	EYE PROTECTION
	UIPMENTS NAME (CONTROL OF THE STATE OF THE S
	SECTION IX SPECIAL PRECAUTIONS
PATCAUTIONS TO HE TA	ALM IN HANDLINGS NO S CAINO STATE ST
15.50 中文化 16.60	The control of the co
OTHER PRECAUTIONS	

While the information and recommendations set forth herein are believed to be accurate as of the date hereof, MONSANTO COMPANY MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

# APPROVED BY THE PREATMENT OF LABOR STEETS PORM OSHA 20 MATERIAL SAFETY DATA SHEET



<b>\$</b>	спон і			
PRODUCT NAME: Solvent KB-3		SIZE:	•	
CHEMICAL NAME: Mixed Aliphatic Ketones	Mark Andrews			e e e
FORMULA: Mixture				
MANUFACTURER: Marketed by Eastman Chemic	al Products, Inc.		$\mathcal{C}_{(H^{n-1}, H^{n-1})}$	
ADDRESS: Kingsport, Tennessee 376	62			
FOR INFORMATION ON HEALTH HAZARDS CALL: Area	615-247-0411 Ext.	3613		y ar in a line
FOR OTHER INFORMATION CALL Ext. 3103	SIGNATURE AND DATE	Information May, 197	n effecti 5	ve as of
SECTION IL HAZARDO	US INGREDIENTS OF MO	CTURES		
PRINCIPAL HAZARDOUS COMPONENT (S)		% %	TLV	(Units)
				<b>♦</b>
SECTION B	PHYSICAL DATA			
BOILING POINT (°E.) Approx. 175°C	SPECIFIC GRAVITY (H2O	=1) Appro	c, .863	
VAPOR PRESSURE (mm Hg.)	PERCENT VOLATILE BY VOLUME (%)			e de la companya de la companya de la companya de la companya de la companya de la companya de la companya de
VAPOR DENSITY, (AIR=1)	EVAPORATION RATE ( = 1)			
SOLUBILITY IN WATER Slightly soluble in w	ater			
APPEARANCE AND ODOR Dark liquid - solvent	odor			
SECTION IV. HERE AN	D EXPLOSION HAZAED	DATA		
FLASH POINT (Method used)	FLAMMABLE LIMITS	grava (1990) i	el	Uel
EXTINGUISHING MEDIA Water, CO, Dry Che	mical			
SPECIAL FIRE FIGHTING				
None :			··	
UNUSUAL FIRE AND EXPLOSION HAZARDS None		7. T	OLS010	451

THRESHOLD LIMIT VALUE Not established EFFECTS OF OVEREXPOSURE Prolonged contact may cause skin irritation. Repeated contact may result in skin sensitization in susceptive individuals. High vapor concentrations may cause mucous membrane and respiratory tract irritation. EMERGENCY AND FIRST AID
PROCEDURES Skin Contact: Flush affected areas thoroughly, with water. Eye Contact: Irrigate with water for 15 minutes and get medical attention. SECTION VI REACTIVITY DATA STABLE STABLE CONDITIONS TO AVOID INCOMPATIBILITY (Materials to avoid) HAZARDOUS
DECOMPOSITION PRODUCTS HAZARDOUS POLYMERIZATION CONDITIONS TO AVOID May Occur Will Not Occur SECTION VI SMILL OR LEAK PROCEDURES STEPS TO BE TAKEN IN CASE MATERIAL IS
RELEASED OR SPILLED L'Soak with absorbent material and incinerate. WASTE DESPOSAL METHOD SECTION VIN SPECIAL PROTECTION DIPORMATION vapor utablevated temperatures VENTILATION LOCAL EXHAUST X if needed to control MECHANICAL (general) X SPECIAL PORT OF OTHER PROTECTIVE GLOVES OTHER PROTECTIVE SECTION IX SPECIAL PRECAUTIONS PRECAUTIONS TO BE TAKEN "表现"的概念数字。 IN HANDLING AND STORING Avoid eye contact and prolonged or inhalation of vapor. repeated skin contact. Avoid TOLS010452

### SECTION 2 - HAZARDOUS INGREDIENTS

	MATERIAL OR COMPONENT	**
CXC XX	Butanol Andrews Transfer of the Control of the Cont	10
	Toluene *	8
75.4	AND THE RESIDENCE OF THE PARTY	1 evi

## SECTION 3 - PHYSICAL PROPERTIES

	Melting Point
Specific Gravity (H20=1) .952 @ 60°F	Vapor Pressure
Vapor Density (Air=1)	Insoluble
% Volatiles By Vol.	eybboom киженухнимнх pH (1% of solution) 6-8
Dark reddish-black liquid with s	

### SECTION 4 FLAMMABILITY AND EXPLOSIVE PROPERTIES

Flash Point (Test Method)	
Lawer Company of the	<u> </u>
Extinguishing Media Foam, CO2, dry chemical	
Fight as any hydrocarbon type fire	
Unusual Fire and Explosion Hazard May evolve toxic NO2 fumes	

### SECTION 5 — HEALTH HAZARD DATA

Threshold Limit Value None established for product. Butanol - s	kin (ceiling)
inhalation may result in hausea, headaches and dizzine	
Narcosis may develop to the state of the sta	
EMERGENCY AND FIRST AID PROCEDURES  Flush with water for 15 min. Call a physician.	_ TOLS010453
Wash with soap and rinse with plenty of water.	
Do not induce vomiting. Give water or milk. Call	a physician.
Remove to fresh air.	

FORM 507 (7/75) (Continued on Reverse Side)

TOTAL DESIGNATION OF THE PROPERTY OF THE PROPE				The second second
SECTION 6 PREACT				~~~
Stabilitys Stable Unstable XX	Conditions to Avoid	<b>生物性的</b>		
		A STATE OF THE STA		Avs
Materials to Avoid	Unburned	hydrocarbons		
Hazardous Decomposition	n Products			100° s; 100° s; 110° s;
Hazardous Polymerization	WIII Not Occur KK	74 TEN		
	May Occur Condition	s to Avoid		10.79
SECTION 7 SPULL C	R LEAK PROCEDURE	:e		· · · · · · · · · · · · · · · · · · ·
	SALE SECTION AND ADDRESS OF THE SECTION ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF	Constitution of the		で all 報告
Steps to Take in Case Mat	terial is Released or Spilled CO	ntain with ab	sorbent material	. Use
	and water to re	lieve\slipper	y conditions.	<u> </u>
Waste Disposal Method	Complete combu	stion		Y.Y.
				() (1) (1)
SECTION 8 - SPECIA	L PROTECTION INFO	RMATION		
Company of the second		Francisco Maria		
Type of Respiratory Prote	ection Required Organi	c canister ma	y be used	
The second of the second	ist 집; Mechanical (General)	: Special (Specify)	Other (Specify)	
Protective Gloves	Rubber	Eye Protection	Goggles	15.
Other Protective Equipme	Impervious ap	ron, eye wash	fountains	
SECTION 9 - SPECIA	L PRECAUTIONS			
Handling and Storage Pre	caution Handle in	adequately ve	ntilated areas.	Do not
THE STATE OF THE S	open flame.			i i
12 15 15 15 18 18 18 18 18 18 18 18 18 18 18 18 18				
<b>亚</b> 罗斯特斯			fumes. Avoid eye	
before rev	<b>从"我们的一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个</b>	ernally. Law	nder contaminated	l cloth
Prepared By	Morbinel	Toxicol	ogy & Industrial Consultant	2/76



#### A. Responsibility

Responsibility for safety rests with the SUPERVISOR at all times. This responsibility covers conditions of work for contractors' employees, workmen from other divisions, and his own men. He must make sure that adequate steps have been taken to eliminate or control the hazards. He must also make sure that all personnel understand the nature of such hazards which remain and the precautions to follow.

#### B. Description

"Enclosed spaces" is defined as, but not limited to, the following:

- Enclosures with limited access openings for personnel, such as closed storage tanks, tank cars, process vessels (usually with only a man-hole for entering).
- Tanks, pits, tubs, vaults, vessels, or other confined spaces with one side open to the air but so deep as to require entrance and aid of an assistant in case of emergency.
- Confined spaces, such as ventilation or exhaust ducts, sewers, underground utility tunnels or pipelines.

#### C. Hazards

The hazards commonly encountered are:

- Toxic vapors in fatal concentrations. This may result from known material in the tank, by gradual release from sludge or scale, or by leakage from interconnected systems due to failure to blank off or disconnect pipelines or ducts.
- 2. Inflammable gases, with potential of fire or explosion.
- 3. Lack of oxygen, causing asphyxiation. This may result from chemicals absorbing or replacing oxygen in the tank air, or from inert gas often used to exclude oxygen to reduce the possibility of explosions. Air in clean tanks closed for an extended period may become deficient in oxygen because of rusting (or oxidation)

- of the metal of the tank, improper or inadequate ventilation during tank work may also result in a lack of oxygen.
- Electric shock from portable lights, tools, or associated electrical equipment.
- Injury from mechanical equipment such as mixers, conveyors, etc., that are inadvertently activated.
- Bodily injury from direct contact with corrosives or dermatitisproducing chemicals.
- Physical hazards such as slipping, falling, and falling objects.
- Burns resulting from accidental opening of a steam valve in a line which has not been blanked off or disconnected.

#### D. Procedures

The hazards inherent in tank entry can be avoided or overcome if the following principles are applied properly each and every time a tank is entered.

No one is to be allowed to enter a treating cylinder, work tank or mix tank which has contained Cellon solution without prior permission from the Manager of Plant Operations, Manager of Engineering or the Division Safety Director. This permission may be requested verbally but written confirmation is to be made. At the conclusion of the project, a written report will be made to the Division Safety Director including the following information:

- 1. Description of the work done.
- 2. Names of employees involved.
- 3. Total exposure time of each employee.
- Personal protective equipment that was used.
- Any other pertinent comments or occurrences.

Provisions for bathing or showering must be provided. The use of the bathing facility is mandatory at the end of the shift or the finish of the job, whichever comes first.

#### 1. Pre-Planning and Education

Survey all tanks requiring entry. Evaluate the hazard potential. All concerned should agree to the detailed standards and procedures established. Be sure everyone understands exactly what is meant.

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AND THE PROPERTY OF THE PARTY O vorkef and supervisor alike should be fully informed both as to fundamentals and specific requirements. There should be appropriate follow: up to insure that the system is being followed exactly. It is not sufficient, merely to set standards; follow-up is necessary for full compliance. Close liaison and job planning between various groups such as production and maintenance is essential. Have specific instructions and a pertinent check list printed on a permit which must be displayed at the job site. -

#### 2. Preparation of Tank

A. Cleaning: According to the nature of the product, clean and void the tank of residual product by hot or cold water flush, by steaming, by chemical neutralization or by air purge. Harmful vapors should be vented safely to the outdoors.

If the tank is steamed, allow it to cool before entry. Do not steam below liquid surfaces in tanks being cleaned. Non-miscible solvents sometimes stratify and bump out at almost explosive pressures due to the difference in boiling point temperatures between the water layer and the solvents.

After the material in the tank has been evacutated to a safe point of discharge, the sludge or incrustation should be removed, to the greatest degree, by operation from outside of the tank. If the tank contained radioactive materials, ascertain in the type and magnitude of radioactivity remaining after cleaning. A time limit for exposure may then be established. Protective clothing and respiratory protection should not be used as a substitute for cleaning and ventilating. Ex-, cept in extreme emergencyfor example, saving of a lifeno one should enter a tank containing a flammable atmosphere or one which because of oxygen deficiency or contamination may be so immediately harmful as to prevent escape from the tank in case of failure of the respiratory equipment.

Ventilation: The tank should be thoroughly ventilated. Make sure that the mechanical exhaust ventilation is arranged to avoid recirculation of contaminated air. After the tank is cleaned and ventilated, keep the mechanical exhaust ventilation equipment operating to provide secondary protection in case of accidental introduction of harmful chemicals; to remove contamination that may be produced by work in the tank such as welding and cutting, painting, coating; and to cool the tank and improve working conditions.

decontamination in-Should liquids. volve flammable vapors, gases, or dusts, all sources of ignition should be eliminated. For example, to eliminate any accumulation of static electricity and prevent autogenous ignition of flammables which may be in the tank, steam should be introduced at relatively low pressure and velocity. Steam lines should be electrically bonded to the tank if it contains any flammable material.

C. Isolation: The tank should be completely isolated from all other systems and equipment. For example, lines connected to the tanks should be physically disconnected and blanked off. Positive and adequate measures must be taken to prevent harmful material-solid, liquid, or vapor-from entering the tank while workmen are inside or after cleaning. This work should be coordinated with cleaning operations to prevent re-contamination. In all cases where lines have contained hazardous fluids or inert gas, or where they contain fluids at high pressures or temperatures, the lines should be physically disconnected by removal of valves, spool pieces, or expansion joints, and blank flanges placed in the lines. Exceptions to normal blanking procedure, such as bleeder valves tagged in the open position, should be approved only

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by qualified supervision Exceptions should be made only when thoroughly justified and not as a matter of expediency. In these cases, adequate alternative measures must be taken to protect the worker

Experience has shown that valves although closed, may leak dangerous liquid or gas. This will require either disconnecting, capping, or blanking? all service, process, vent, or overflow lines on a given unit to prevent entrance of material by leakage through (or accidental opening of) a valve. This should include steam connections to a jacket. In case of welding on the wall between the inner tank and jacket, it should also include 3 water, 3 brine, or air lines to the jacket. Open ends of disconnected lines should be blanked or capped to prevent any flow from the disconnected end of the line entering a tank opening or draining onto assistants on the outside. Blanks should, be installed as close to the tank as practicable to prevent a drainage from trapped sections. Drains or overflow lines should be disconnected or blanked if they extend into a sewer from ? which steam or fumes could be conducted back to the tank, or if they connect to other equip-? ment or extend to a remote location. All blanks should be of materials which are not susceptible to corrosion by the chemicals to which they are exposed with different types. adequately identified. Blanks should be of such thickness and tensile strength as to satisfy the maximum pressure; which may be imposed upon them without distortion or failure.

D. Lock Out. (See MCA Safety Guide No. 8- Electrical Switch Lock-Out Procedure.) Line-disconnect switches supplying power to any mechanical apparatus in the tank such as mixers, conveyors, etc. should be tagged and locked in the "off" position. It is not adequate to lock a push button station as it still may be poss-

ible to energize the circuit. The key shuld be kept by the man in the tank, and he alone should be authorized to unlock the switch and remove the tag on completion of the job. Where more than one man is exposed, each should place his own lock on the switch. In certain cases it may be advisable, as further protection, to have a plant electrician pull the line fuses in the electrical circuit involved or take other positive steps to guard against accidental energization. Where there is a line shaft, the belt or chain drive should be removed or similar positive measures provided, such as mechanical latches.

E. Testing: If the tank has held any flammable or harmful product before flushing; if it contains any residue or sludge which may release flammable or harmful gases or vapors; or if oxygen deficiency or excess is suspected or even possible, a test of the atmosphere in the tank should be made immediately before entering and before performing any hot work such as the lighting of torches. Presence of flammable or toxic vapors, excess oxygen or oxygen deficiency should be determined by direct reading instruments or chemical analysis. Single-fluid instruments which absorb both oxygen and carbon dioxide should not be used for oxygen determination. Interim tests of the atmosphere in the tank should be made as often as necessary while the work is in progress. Continuous sampling and analysis with automatic alarm may be indicated.

## 3. Issuance of Safety Work Permit for Entry

The Safety Work Permit is authorization and approval in writing. It serves as a method of formalizing agreed upon procedures. It is also a check list to insure that all existing hazards are considered, evaluated, and correct protective measures taken.

No employee should enter any tank without reporting to and securing

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approval from his immediate supervisor. The supervisor in turn secures entry approval from the supervisor to whom the tank is assigned. The tank supervisor should then discuss the project in detail with those entering the tank. He should review the hazards of the product or other materials to which they may be exposed and furnish all the safety information he may be able to provide. Then supervisors of the men involved should review and complete the permit form jointly. Appropriate supervisors must be certain by personal investigation, immediately be fore entry and before signing the permit, that the entry and its incidental work will be safe. If a pause of appreciable duration occurs during the carrying out of a job, the site must be re-investigated by the authorized signer before the job can be allowed to resume. Commencement of a new shift should always require re-investigation and a new permit. No permit should be valid except for the job, location, persons, and time specified.

Section 1

#### <sup>-</sup> E. Precautions

#### 1. Tools

Hand tools should be clean, in good condition, and selected carefully according to the uses intended. Spark-resistant hand tools are preferred where a possibility of flammable vapors or gases exists unless the area is well wetted down with water. Portable power tools and equipment should be clean and in good condition. Electrical tools and equipment (such as hand lamps and extension cords) should be grounded. If the tank is a "Hazardous Location" under the definitions of the National Electrical Code, it should be of the explosion proof type. If any Class I exposure (also Class II in dangerous flammable dust concentrations) it may be found preferable to use air-operated power tools. Even in these circumstances, careful thought must be given to the possibility of fire orexplosion arising from struck sparks, overheating of the tool (as in drilling), electrostatic generation from discharge of compressed air, or other mechanical sources. The use of low voltage (32 volts or less) lighting and electrical equipment serves to minimize further the possible hazard of electric shock.

Ladders used in tanks should be lashed at the top, and, if possible, at the bottom. Employees performing electrical welding in tanks should be provided and required to use rubber blankets and such other personal protective equipment as may be required. Welding and cutting torches must not be taken into the tank until ready to be used. They must be removed from the tank immediately after use. Cylinders of oxygen or other gas should never be taken into tanks, and should be turned off at the cylinder valve when not in use.

Special signs posted near the tank help keep unnecessary people away. They insure that potentially harmful operations will not be started independently nearby. And they help guide rescuers should they be necessary.

2. Personal Protective Equipment
Proper protection may range from
complete coverage suits to
chemical goggles, hard hats,
gloves, and safety shoes.

Employees should never unduly expose the skin when working in tanks. They should wear full coverage of clothing at all times. When burning or welding is done inside a tank, supervision should consider the use of flame-proofed clothing by the employees involved. Working bareheaded, with shirt sleeves rolled up, or in an undershirt is considered hazardous.

Certified breathing air, from self-contained units, central systems such as cylinders of air, or suitable compressors should be supplied if a safe atmosphere cannot be guaranteed and if there is any possibility of air contamination or if there is oxygen deficiency while employees are within an enclosed vessel. The use of canister type masks (which operate on the principle of chemical absorption of mechanical filtration) may not afford adequate protection and should,

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Equipment should bear Bureau of Mines: approval. It should be suited specifically to the type of exposure and protect against the worst condition that might be encountered. For specifically recommended protection refer to MCA Chemical Safety & Data Sheets or another authoritative source. The best type of respiratory protection should be ascertained in advance according to the specific exposure involved.

#### 3. Emergency and Rescue 🕸

Where the potential exposure in the tank is acute, or requires an 💸 employee to wear respiratory protection, or rescue may be difficult, a body harness with lifeline must be provided. It is good ? practice to use a body harness for any vessel entry work. A safety harness or safety coveralls with a built-in harness and lifeline shall be used when tank space permits the safe emergency removal of personnel by standby manual personnel without requiring entry of the tank.

When the tank space does not a meet this requirement a specific procedure for the rescue of personnel must be developed in the pre-planning stage of the tank entry work. It must be made a specific part of the Safety Work Permit. In some cases it is advisable to have a block and tackle positioned on a tripod or otherwise lastened above the manhole. For obvious reasons, manholes large enough to accommodate the man and his safety gear should be provided, such as a 24" diameter for circular ones. If manholes are smaller than 20" in the largest dimension, wrist harnesses often are practical. The free end of the lifeline should be 4 secured to a fixed object. It 🖁 should be attended by an observer who will keep the man inthe tank always within his vision. The observer may pass tools. He must have no other job which will take his attention away from the man in the tank; which will interfere with his attempts to withdraw the victim by use of the lifeline; or which will require his

leaving the vicinity of the tank any time whatever.

In case of emergency, the outside observer must never enter the tank until he is relieved at his post. It is his job to summon aid immediately (various alarms, such as a whistle, may be used); to attempt to remove the victim by use of the lifeline, and to perform all other necessary rescue functions from outside. Upon the arrival of help, he may enter the tank for rescue work only when he is assured that his outside assistance is adequate. Such safety observers should be well trained in basic First Aid principles, such as rescue breathing techniques. Rescuers entering tank must be protected with the safety facilities required by the situation, i.e., lifeline and harness, and proper personal protective equipment. For rescue purposes at least one unit of self-contained breathing equipment should be located outside and convenient to the tank together with harness. rope, and such other emergency equipment as may be indicated. It is better to have too much equipment at the job site than too little-too late! Where hazardous chemicals may be contacted in the course of fank work or where the possibility of fire is involved. a charged hose line with spray nozzle should be available nearby. The number of men in a tank, particularly at the time of burning or welding, must be reduced to the absolute minimum necessary for the work itself.

The supervisors concerned must be trained to be on the alert, before and during the job to detect and correct immediately new and different hazards or to stop the work until the new hazards are corrected.

#### F. Cleaning Tanks Containing Flammable Materials

#### 1. General Precautions

A. Workmen must be familiar with fire and accident prevention regulations and comply with them in every respect. These regulations cover fire, explosion, as-

- phyxiation, and possible poisoning from toxic material.
- B. Before tank cleaning oper ations are started, all sources of ignition such as open fires, trucks, automobiles, etc., must be removed or eliminated from the vicinity. Wind and weather conditions must be considered. Work must not be started if the wind might carry highly inflammable vapors into an area where they could create a fire hazard. No matches or lighters may be carried, and smoking must be strictly prohibited.
- C. Workmen will be provided with proper equipment, including suitable clothing, proper eye or face protection, tools, safety belts, safety lines, and fresh air hose masks when required. The foreman should see that the equipment is of proper type, clean, and in good condition, and that the workmen are properly instructed in its use.
- D. Workmen are not permitted to enter tanks until the tank has been tested and it is definitely de: rmined that the vapor concentration has been reduced to the point where there is no danger. At all times flammable or toxic mictures must be assumed to be present until tests have been proven otherwise.

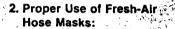
NOTE: Tank vapor concentrations should be tested with an approved gas detector only such as the EXPLOSIMETER. See Proper Operation of Explosimeters. E. While working in the tanks, the atmosphere inside must be rechecked periodically for dangerous vapor mixtures.

mixtures may again be formed, through admission of flammable vapors or liquids from other sources such as an unblanked line or connection, a break in the tank bottom, sludge, sediment, sidewall scale, etc.

- F. Workers must always have a clear path of escape from the tank. They should bear in mind that they may have to use it in a hurry. Ladders should be used when a tank must be entered from above. They should be left secured until the last man is out of the tank.
- G. A safety man (commonly called "fire watch") must be outside the tank anytime anyone is inside. In case of an emergency, the safety man must not enter the tank until he secures more help.
- H. Where lights are needed, use only lights approved for combustible atmospheres by Underwriters Laboratories.
- Where power tools are used to clean tanks, extreme care must be exercised to keep from damaging or marring the tank.
- J. Goggles must be worn when cutting rivets, scraping scale, operating power tools, and digging residue with a pick or shovel.
- K. Where gas or vapor may be present and where a spark may cause ignition, use tools and equipment of nonsparking material such as wood, fiber, bronze or beryllium copper.
- L. Steam lines, if used for heating and ventilating the tank, must br grounded to the tank shell to prevent static accumulation.
- M. Hot work (welding, riveting, etc.) shall be permitted in tanks only after the tanks are reasonably clean and tests have determined it to be free of flammable and toxic mixtures.
- N. If a possibility of an oxygen deficiency exists in a tank, blow fresh air into it. When a tank has been closed for some time, rusting (oxidation) of the tank metal or materials in the tank may cause a deficiency. In that case, no one may enter the tank without a supplied air hose mask before the tank has been properly ventilated. Do not use Canister masks where there is a



- possible oxygen deficiency.
  O Tank workers overcome by vapors must be removed to fresh air immediately and artificial respiration administered until breathing resumes. Call a doctor at once and keep the resuscitated man quiet and warm until breathing and circulation become normal.
- P. Report all injuries to your foreman immediately.
- Q. A work order must be properly authorized before work of any kind is performed where there is a possible explosive vapor concentration.
- R. Adequate fire fighting equipment must be on hand for, any fire which may result. from any phase of the tank cleaning operation. OB-SERVE THE PLANT FIRE RULES.
- S. When the tank is clean, care must be exercised to see that all foreign material such as tools, pieces of pipe, etc., are removed from the tank before it is placed back in service.



When fresh-air hose masks are used, the following safety precautions must be observed:

- A. Approved fresh-air hose masks and lifelines must be worn by men entering tanks unless ventilation has reduced flammable vapors to 0.1%.
- B. The mask must be thoroughly inspected and found to be in safe operating condition before using.
- C, Hats or caps should be removed. The mouth shall be cleared of tobacco, etc., before adjusting mask to the head.
- D. All fittings on the hose and mask must be light. There should be no leaks around the face piece.
- E. The air intake to the hose leading to the mask must be kept in fresh uncontaminated air.
- F. Any person wearing the gas

- mask must be kept under constant observation by another man while he is in the tank. Two or more men should be available to aid in his rescue should he become unconscious.
- G. If a workman is overcome by vapors, he must be removed to fresh air immediately. Artificial respiration must be administered until he resumes breathing.
- H. A doctor must be called at once. The resuscitated man must be kept quiet and warm until breathing and circulation have become normal
- When it is necessary for the rescuer to go inside the tank, the rescuer first must get help and then equip himself with adequate respiratory protection before entering the tank.
- J. Gas-mask face pieces must be cleaned and sterilized after use and put into condition for use again.
- K. Workmen are not permitted to enter tanks containing toxic or inflammable mixtures without the expressed permission of the plant superintendent or a supervisor delegated by him.
- All injuries must be reported to your foreman immediately.

## 3. Proper Operation of Explosimeters:

The individual making tests with the Explosimeter must be thoroughly familiar with the instrument and be satisfied that it is in proper working order. The following recommendations should be observed to insure proper operation of the Explosimeter:

- A. The batteries in the Explosimeter should be replaced monthly with fresh batteries, or more often if used frequently.
- B. The instrument should be checked before it is used by placing the open end of the sample line into the neck of a bottle containing benzol. (CAUTION: Do not allow the open end of the sample



- line to touch the liquid benzol.) The aspirator bulb should be squeezed until the instrument definitely shows an explosive material. The sample line should then be removed to normal atmosphere and the instrument purged, by squeezing the aspirator, until the needle goes back to zero.
- C. After checking the Explosimeter, the needle is again adjusted to zero, by means of the rheostat, and the tank is then tested.
- D. Tank tests should not be made in the presence of steam.
- E. After testing the tank, the Explosimeter should be again recalibrated and rechecked by sampling the benzol bottle.

#### 4. Tank Preparation:

- A. Contents of the tank must be pumped out as completely as possible through the regular pump-out line. When desirable, water can be added to raise the liquid level to the pump suction to remove additional or possibly all of the liquid contents.
- B. Supply lines and swing lines must be thoroughly washed out and either blanked off close to the tank with slip blanks between flanges, or disconnected and provided with bull plugs or blank flanges. Do not rely on valves for positive shutoff.
- C. The tank must be purged of all toxic or explosive vapors before workmen may enter the tank to remove residue, perform repair work, etc.
- D. Preparing Underground Storage Tanks:

This type of vessel requires extra care to prevent leakage of flammable liquids or vapors from the outside ground area into the tank after it has been tested and found vapor-free. Lines into or from the tank should be isolated so that vapors cannot drift into the area or into the tank.

- E. The sale practices outlined for shore tanks are not applicable for tank barges. Such vessels are all subject to the regulations of the U.S. Coast Guard for tank vessels.
- F. Preparing Tank Cars:

The material in tank cars can be divided roughly into two divisions; those containing oils such as creosote, etc., and those containing the heavier material such as tars, pitches, etc.

The cars containing oils should be thoroughly steamed. Then the steam should be shut off; the tank car should be permitted to cool; it should be ventilated, and gas tests should be made.

Tank cars, which have been used for tar or similar material, should be ventilated for at least five hours before gas tests are made. Steaming should be used if desirable.

- G. Tank cars must be steamed clean when welding and cutting operations are done inside the car. When welding is performed on the outside of the car, the tank should be live steamed for 20 minutes and steam should be left in car while welding.
- H. A safety man must be placed in attendance until the operation is proven safe.
- I. When the cars are not provided with a permanent inside ladder, a removable ladder must be used. It should be a well constructed, light metal ladder that will extend from the bottom of the car into the dome. However, it should not protrude through the hole in the dome of the car. This would not allow a man to enter through the dome into the car.

#### 5. Ventilating

Before workmen enter tanks satisfactory, ventilation must be established in the tank Quite often natural ventilation is not satisfactory. This is true in underground storage tanks and tank cars which normally are equipped with one opening. Therefore, the use of wind sails, steam or air operated exhausters, or electrically driven blowers may be required. Air movers or exhausters should be bonded to the tank and all electric motors must be sparkproof.

Additional ventilation may be obtained in tank cars by the use of water. With a "bareback" shell car, water may be sprayed on the outside of the car. With an insulated car, cold water may be sprayed on the inside of the car shell, or the car filled with cold water and then drained. Cold water running through steam coils in the cars will considerably reduce the temperature in the car.

#### 6. Sweetening Tanks

After a tank has been purged and tested to be free of all dangerous gas, some plants have distributed slaked lime on the remaining residue (before workmen enter the tank) with good results. The slaked lime tends to rid the tank of undesirable odors. It has also been found desirable to add lime to the water when boiling out tanks.

#### 7. Cylinder Entry

- A. Entry of a cylinder is prohibited until the bridge rail has been removed or the track taken out of service by posting signs or blue flags.
- B. The door secured to prevent closure.







## TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

September 19, 1988

Mr. Bill Giarla Koppers Company, Inc. Koppers Building, Room 750 Pittsburg, Pennsylvania 15219

Dear Mr. Giarla:

On July 27, 1988 you and I discussed the matter of the costs incurred in the cleanup of Koppers' pentachlorophenol at Time Oil's Northwest Terminal in Portland. Since that time, Time Oil has been searching for an economic and effective method of disposing of the problem. In that regard, enclosed is a preliminary work plan prepared by Ecova Corporation for the cleanup of the pentacholorophenol contaminated soils. Although Time Oil is still in the process of evaluating the merits of the work plan, we anticipate following it subject to approval by the Oregon Department of Environmental Quality.

The cost of the proposed cleanup and related work is estimated at \$400,000. Pursuant to the January 23, 1986 agreement between Koppers and Time Oil, Kopper's share would be \$200,000.

As a reminder, Time Oil has spent \$118,371.10 to date on investigation and cleanup of our/mutual problem. Of this we have invoiced you \$54,780.28 by invoices dated 3/6/86 and 4/17/87 (copies enclosed). We have not yet received payment for those invoices. Also enclosed is our invoice dated 9/21/88 for \$4,405.27, which brings Kopper's total share of moneys spent to date to \$59,185.55.

Very truly yours,

TIME OIL CO.

Terrill L. Henderson Corporate Counsel

iru:bla

**Enclosures** 

0297C



TI E OIL CO.

P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-04-1/ 2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233 . PHONE (206) 285-2400

INVOICE 091848

DATE 03/06/86 REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:

KOPPERS COMPANY INC ATTN: DONALD F. MARION KOPPERS BUILDING ROOM 750 PITTSBURGH PA 15219 657 60 123 27831.21 120

14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, OREGUN.

#### EXPENDITURES

4/26/85 CHEN-SECURITY SYSTEMS

(LABORATORY ANALYSIS UF SOIL SAMPLES)

150.00

7/10/85 NORTHWEST VACUUM TRUCK SERVICE-

(RELOCATING 242.76 TONS OF SOIL TO ARLINGTON) 9,000.00

7/29/85 CHEM-SECURITY SYSTEMS

(RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)

27,270.88

8/8/85 ENVIRUNMENTAL EMERGENCY SERVICES

(OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES) 12/31/85 ENVIRONMENTAL EMERGENCY SERVICES

(PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)

18,741.55

55,662.43

#### COMMITTHENTS

DEQ PER DAR 240-102-065 \*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2) 3,500.00

25,000.00+

84,162.43

50% =

42,081.21

\*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL

\$42,081.21

TOLS010465

Encl. 1

ACCOUNTS RECEIVA

K-64

C00575

TIME OIL CO.

SOX 24447 TERM. STATIOF - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY SEATTLE WA 98199-1233
PHONE (206) 235-2400

DESIT MEMO 020190

DATE 04/17/37 REF. 04-03131 FER

CUSTOMER #: 03/05505623

ACCOUNT:

KOPPERS COMPANY
Koppers Building - Room 750

Pittsburgh, PA 15219 ATTN: JAY STEBBINS 120 9 12699.07

THIS IS AN ADDITION TO INVOICE # 091363 DATED MARCH 6, 1985 FOR \$ 42,031.21 TO CHARGE YOU FOR HALF OF EXPENDITURES, PER MUTUTAL AGREEMENT, IN REFERENCE TO CLEAN UP COSTS AT 12035 NORTH BURGARD PORTLAND, OREGON.

12,699.07

COPIES OF THE ORIGINAL INVOICE (#071369, 3/6/86, \$42081.21) AND THE UPDATED CHARGES FOR 5 54730.23 ARE ATTACHED.

INVOICE TOTAL \$12,699.07

TOLS010466

ORIGINAL

K-64

000576

P.O.BOX 24447 TERM. STATION SEATTLE WA 98124-0447 2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233 PHONE (206) 285-2400 ""INVOICE" 056677

DATE 09/21/88 REF. 09-03116 CJC

CUSTOMER #: 03/05505623

ACCOUNT:

657 60 123

4405-27

KOPPERS COMPANY INC
KOPPERS BUILDING ROOM 750
ATTN: BILL GIARLA
PITTSBURGH PA 15219

TO CHARGE YOU FOR 1/2 THE FOLLOWING PWR MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N BURGARD RD, PORTLAND OREGON

EXPENDITURES
11/9/87 SRH-COLLECT AND ANALIZE

WATER SAMPLES

2810.53

8/31/88 ECOVA-PREPARE PENTA CLEANUP WORK PLAN

6000-00

8810.53

50x= 4405<sub>2</sub>7

4,405.27

INVOICE TOTAL

\$4,405.27

WHILE YOU WERE OUT Telephoned Will Call Again Called To See You Wants To See You Returned Your Call ٠.: K-56 Printed in U.S.A.

TOLS010468

000581

NORTHWEST TERMINAL
COSTS OF INVESTIGATION AND CLEAN-UP

DATE	REFERENCE	AMOUNT	EXPLANATION
04/30/85	Invoice	150.00	Chem-Security Systems - Lab fees
07/09/85	Contract	9,000.00	NW Vacuum Truck Service - Soil removal
07/29/85	Contract	27,270.88	Chem-Security Systems - Soil disposal
08/08/85	27526	500.00	Riedel - Obtain & analyze 3 soil samples
12/05/85	Contract 1985 Total	18,741.55 \$55,662.43	Riedel - Obtain & analyze soil samples
03/24/86	Ck. #160461	17,252.67	Riedel - Wall demo & well installation
05/16/86	63790	3,702.66	Instrumentation NW - Well point materials
06/10/86	Invoice	3,500.00	DEQ - Hazardous waste disposal fee
06/11/86	61750	2,739.50	Century Envir - Analyze water samples
07/08/86	63520	1,800.00	Century Envir - Analyze water samples
08/80/86	Ck. #27165	4,452.81	Riedel - Install 3 Monitoring Wells
08/15/86	64261	390.00	Concrete Coring Co Holes in floor
08/25/86		1,465.00	Jack Eatch Construction Co Relocate soil
10/01/86	Invoice	18,465.00	SRH - Project history and review of alternatives
01/26/87	Ck. #176587 1986 Total	130.50 \$53,898.14	Century West - Analyze March 1986 water samples
11/09/87	Invoice 1987 Total	2,810.53 \$ 2,810.53	SRH - Collect and analyze water samples
08/31/88	72738 1988 Total	\$ 6,000.00 \$ 6,000.00	Ecova - Prepare penta clean-up work plan

Total to Date \$118,371.10

0149E

SEATTLE TACOMA PORTLAND STOCKTON RENO RICHMOND LOS ANGELES



SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

11/30 called T. Henderson wcb

12/2 called T. Henderson wcb

12/2 called T. Henderson wcb

12/8 called T. Henderson wcb

November 17, 1988

Mr. Frederick C. Moore
President
Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, Pennsylvania 15219

Dear Mr. Moore:

I am writing to you in hopes of resolving a situation that exists between Time Oil Co. and Koppers before it develops into a needless and costly dispute.

Briefly, the situation arises out of an agreement dated March 1, 1967 under which Time Oil agreed to provide certain labor and services to store and blend wood preservatives containing pentachloraphenol belonging to Koppers Company at our Portland, Oregon terminal. After the agreement was terminated in 1982 it was discovered that the ground at the terminal contains substantial quantities of the product belonging to Koppers. As you know pentachloraphenol is a hazardous substance under federal and state law and gives rise to authority by the federal and state governments to compel cleanup of the product by responsible parties including the owner of the product.

Since the problem first materialized Time Oil has been in contact with Koppers Company and initially there appeared to be willingness on the part of Koppers to work with Time to resolve this problem as inexpensively as possible and without exciting the interest of the federal and state authorities. To that end we met with Koppers personnel on January 23, 1986 in Pittsburgh where an agreement in principle was reached under which the cost of resolving this problem would be shared on a fifty fifty basis.

It is not my purpose here to detail the efforts that Time Oil has undertaken to resolve this environmental problem nor the efforts it has taken to obtain the continued cooperation of Koppers. Suffice it to say here that within the last year and half Koppers Company appears to be simply ignoring the problem and our communications.

0297C

Mr. Frederick C. Moore November 17, 1988 Page 2

I would appreciate anything you might be able to do to advise us as to how this matter may be resolved. My telephone number is (206) 285-2400.

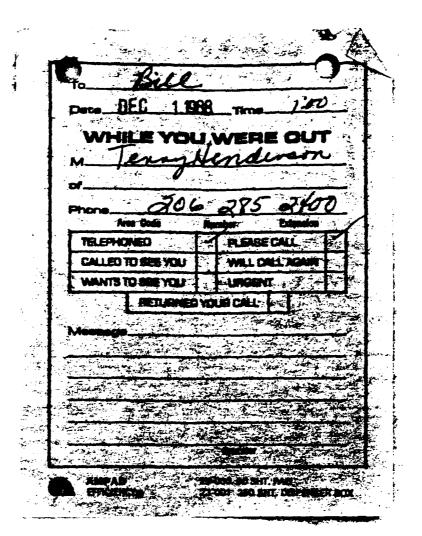
Very truly yours,

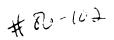
TIME OIL CO.

Robert D. Abendroth Vice President

RDA:TLH:pjv

cc Mr. Bill Giarla
Koppers Company, Inc.
Koppers Building, Room 750
Pittsburgh, Pennsylvania 15219









## TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

January 13, 1989

William F. Giarla Koppers Company, Inc. 436 Seventh Avenue Pittsburgh, PA 15219

Re: Northwest Terminal

Dear Mr. Giarla:

Thank you for your letter of December 21, 1988. I look forward to hearing from you on the matter of setting up a meeting between Koppers and Time Oil management personnel to resolve the question of payment for the cleanup costs associated with storage and blending of Koppers Company's penta at our Portland facility. In fact, our facility in Portland may be an appropriate place for such a meeting.

As of this Friday we have not yet received Koppers check for \$59,185.55 you referred to in your letter.

Thank you for your assistance and I look forward to hearing from you soon.

Very truly yours,

TIME, OIL CO.

Terrill L Henderson Corporate Counsel

TLH:m

0047C

TOLS010473

000573

PHONE 285-2400 CABLE ADDRESS, TIMOIL

SEATTLE TACOMA PORTLAND STOCKTON RENO RICHMOND LOS ANGELES

C: KU Manuela



(1/30/89)

## TIME OIL COMPANY

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98124-0447

(FAX) 206-283-8036

January 27, 1989

William F. Giarla Koppers Company, Inc. 436 Seventh Avenue Pittsburgh, PA 15219

Re: Meeting - Portland, Oregon

March 1, 1989

Dear Bill:

This is to confirm our discussion yesterday in which we agreed that March 1, 1989 would be an agreeable date to meet at Time Oil Co.'s facility at 12005 North Burgard, Portland, Oregon. The purpose of the meeting to be for us to review the remedial measures that have been and will be taken at the facility in order to remove the pentachlorophenol in the soil surrounding the tanks that had been used to store Koppers' products and to resolve the division of responsibility for the costs being incurred in this cleanup.

Please let me know what time would be most convenient for you to meet. We look forward to meeting you and working with Koppers to resolve this matter in a manner that will be fair to both companies.

Very truly yours,

TIME OIL CO.

Terrill L. Henderson

Corporate Counsel

TLH: mw

cc: Robert D. Abendroth

Fred Proby

TOLS010474

0063C

# NORTHWEST TERMINAL PENTACHLOROPHENOL CLEANUP

### PROJECT SCHEDULE AS OF MARCH 15, 1989

Commence site mobilization	December 5, 1988
Startup/Shakedown of treatment operations	March 27 - May 1, 1989
Complete initial excavation and backfill	April 14
Treatment Operations	May 1 - December 15
Final Excavation and backfill	October 1 – 30
Demobilization	January 2 - 14, 1990

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EPA not be esponsibilundreds of a ruling on superfund

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ene that had been buried for 18 months. The degradable plastic had broken down into many small pieces; much of it was gone, but the traditional plastic was still intact.

A research scientist for Archer Daniels Midland, a major manufacturer of the cornstarch products, told BNA that because the starch contains oxygen, it serves as a catalyst to break down the plastic. In low oxygen situations, as low as 2 parts per million, degradation still takes place.

"Dry environments do slow it down to very low levels," he said, adding that municipal solid waste composting facilities are the best places for decomposition because moisture is added.

Richard Denison, senior scientist with the Environmental Defense Fund, the environmental group that led the call for the consumer boycott Dec. 12, told BNA after the news conference that the industry representatives left many of EDF's charges unanswered (20 ER 1418).

"There was no new data on rates of degradation in landfills," Denison said. "Rates of degradation are not fast enough to make any difference at all."

The industry also did not address the fact that some additives that are non-toxic at first change into toxic substances during decomposition, he said.

Denison said some plastic recyclers have stopped taking bags because it costs too much to separate degradables from non-degradables, and he added that the compost at a municipal solid waste composting facility in Nebraska was recently found to be contaminated with cadmium and lead.

"This is absolutely a means of selling corn," Denison said.
"If they sold [degradables] saying they're good for the American farmer, I'd have a lot less of a problem with them."

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#### Water Pollution

#### DIOXIN DANGER IN COLUMBIA RIVER FISH DISCOUNTED IN STUDY DONE BY PAPER INDUSTRY

PORTLAND, Ore.—(By a BNA Staff Correspondent)—Fish from the Columbia River are safe to eat, according to a study commissioned by the Northwest Pulp and Paper Association.

At a press conference Dec. 19 the group said dioxin levels in the fish were too low to present a health hazard.

The announcement came within two weeks of the release of data by the Environmental Protection Agency that suggested dioxin levels in some fish and shellfish in the Columbia River may make the fish unsafe to eat (20 ER 1430).

Llewellyn Matthews, executive director of the industry association, said the \$450,000, five-month study is one of the most thorough dioxin fish tissue studies done anywhere. While some of the fish samples revealed traces of dioxin, none of the dioxin levels showed reason for concern, she said.

The Northwest pulp and paper industry hopes that its study will help convince Oregon and Washington regulators to adopt "scientifically valid" water quality standards for dioxins, Matthews said. To date, both states have adopted water quality standards equivalent to EPA's standard of 0.013 part per quadrillion for the discharge of effluent containing 2,3,7,8-TCDD, the most dangerous form of dioxin. The Oregon Department of Environmental Quality and the Washington Department of Ecology have placed 12 of the two states' 14 bleach pulp mills on the list of violators of Section 304(1) of the Clean Water Act.

Andy Elsbree, manager of the James River Corp.'s pulp and paper mill at Camas, Wash., said he hoped the two states would move toward standards recently adopted by other states.

#### **CURRENT DEVELOPMENTS**

Russ Keenan, regional manager of ChemRisk of Maine, the consulting firm that did the association's risk assessment portion of the Columbia River study, said Georgia's water quality standard for the discharge of effluent with 2,3,7,8-TCDD is 7.2 ppq, with Maryland and Virginia having a 1.2 ppq standard

Some 600 fish were collected for the study from the main stem of the Columbia River, which has six pulp and paper mills on it. Four of the fish species were migratory salmon or steelhead and showed little or no dioxin, the study said. The highest levels of dioxin were found in sturgeon at 2.4 parts per trillion and carp at up to 6.8 ppt. Advisory levels of the Food and Drug Administration do not begin limiting food consumption until the level of 25 ppt.

Moreover, the study revealed some of the fish with the highest dioxin levels were taken upstream from the last pulp mill on the river, suggesting that there may be other sources of dioxin on the river in addition to pulp mills, Matthews said.

#### Comparison With EPA Study

By contrast, the association said, EPA's sampling data were based on only 15 fish. It said EPA's study was not intended to be scientific, but a screening action to determine future areas of study. In addition, the association said, EPA took whole body portions of fish, including organs, skin, and fat, while the industry study's sample used fish fillets only. Whole body samples tend to give higher dioxin reports, the association said.

The association's study did not sample crayfish or crab, both of which are commercial shellfish. EPA's study data found higher than previously reported levels of dioxin in these shellfish, especially in crayfish. When asked why the industry study did not include these shellfish, Matthews answered that the study focused on the species of fish most people eat.

Keenan told BNA that the study included carp—even though few people eat it—because as a bottom-feeding resident fish it was a worst-case example. While levels of dioxin were highest in carp of any fish in the study, they were still not of a level for concern, he said.

The EPA data, released earlier in the month under a Freedom of Information Act request, however, showed one carp sample taken at Wallula, Wash., with a dioxin level of 92 ppt, higher than FDA's do-not-eat advisory warning of 50 ppt.

Environmentalists who had requested the most recent EPA data were quick to criticize the industry's study. They said limiting the study to fillets sharply reduces the dioxin level. In a statement issued after the industry's press conference, the Northwest Coalition for Alternatives to Pesticides also said the industry study focused on the wrong species of fish and in the wrong areas of the river.

The coalition cited an affidavit by a Columbia River commercial sturgeon fisherman hired by Beak Consultants Inc., of Portland, the firm contracted by the industry to collect the fish samples. The fisherman said he was instructed to limit his catches to certain areas of the river. These areas did not include the area below the pulp mill at Wallula, Wash., where EPA had collected the carp with the high dioxin level. The areas where he was told to fish were fast-flowing portions of the river less susceptible to sediment settling, he said.

#### Litigation

## COURT WILL NOT REVIEW EPA POLICY STATEMENT CONCERNING CONTROL OF MILLS' DIOXIN DISCHARGES

A federal district court ruled Dec. 4 that it lacked jurisdiction to hear a challenge to an Environmental Protection

12-29-89

Environment 0013-9211/8 made available. With EPA expecting the states to implement environmental standards, it is important that it provide the states with information they need, he told BNA.

"It is unfortunate that we learned of some of the information in the Region X files only when it was released to a local environmental group under a Freedom of Information Act request," Fred Hansen, director of the Oregon Department of Environmental Quality, said in a Dec. 11 letter to EPA Administrator William K. Reilly. The information released to the environmental group and its implications for regulatory actions are significant, he said.

At EPA, Ken Brooks, director of the agency's Oregon office, countered that EPA technical staff had been sharing the controversial fish sampling data with their counterparts at DEQ before the public release in an effort to determine its significance. However, upper management at DEQ may not have been aware of the raw data or its implications, he told BNA. Repeated calls to EPA officials at Region 10 headquarters in Seattle were not returned.

"I am disturbed that EPA is not alerting states when significant information is available," Chris Gregoire, director of the Washington Department of Ecology, said in a Dec. 12 letter to Reilly. Although EPA had provided periodic updates of raw data on dioxin levels, it was "especially unfortunate" that the significance of this data was released first in a public forum, she said.

The situation followed another incident in which EPA's lack of forewarning to the department prevented it from preparing answers to public inquiries, Gregoire said. "This recurring pattern leads me to ask that EPA reassess its public information strategy to allow your partners—the states—to effectively meet their responsibilities to their residents," she said.

#### Industry Critical Of Use Of Sampling Data

For its part, the pulp and paper industry was critical of environmentalists' and EPA's use of the sampling data in calculating long-term cancer effects in humans. In its study, EPA used a "toxic equivalency concentration factor" that measured the toxicity of dioxins and furans other than just 2,3,7,8-TCDD, the most potent of the dioxins. Then this factor was used to determine the carcinogenic risk to humans, a scientifically improper risk assessment, according to Douglas Morrison, a public affairs analyst with the Northwest Pulp & Paper Association in Bellevue, Wash.

The EPA survey was a screening study, not a systematic one, Morrison told BNA. An industry-funded study of dioxins in Northwest rivers is to be released soon and will show a lower risk to humans than the EPA study, he said.

Morrison discounted the health risks indicated by the EPA data, claiming that the Food and Drug Administration's threshold for issuing warnings is much higher than most of the EPA samples. The FDA recommends concern when the toxic equivalency concentration factor reaches 8 parts per trillion, a more serious concern at 25 parts per trillion, and a "do not eat" warning at 50 parts per trillion, he said.

However, some of the most recent samples of fish and shellfish in the Columbia River below a number of pulp and paper mills showed toxic equivalency concentration factors as high as 92 parts per trillion in carp near the Boise Cascade Corp. plant at Wallula, Wash. While few people eat carp, they do eat crayfish, and a crayfish sample taken out of the Willamette River in Portland showed a level of 26 parts per trillion.

Using EPA's formula for assessing health risks, the expected lifetime risk from regularly eating crayfish at the Portland location would be 378 cancers per million people, far in

excess of previous risk estimates, according to John Bonine, a professor at the University of Oregon School of Law who worked with the anti-pesticide group.

#### **Concerns About Not Sharing Data**

The EPA data came to the environmental group when it asked the agency for all recent information on fish samples for dioxins in the Columbia River, according to Mary O'Brien, staff scientist for the coalition. EPA responded promptly to the FOIA request, she said. However, she said, the group was concerned that EPA officials had sat through earlier meetings of the Oregon Environmental Quality Commission when the issue of dioxin risk in the Columbia had been discussed and did not offer to share their most recent data.

O'Brien also faulted DEQ for not providing Oregon legislators information on dioxin levels at a Dec. 8 legislative committee meeting. "It's astounding how little information DEQ gives its legislators," she said.

Fourteen pulp and paper mills in Oregon and Washington use the chlorine bleaching process, Morrison said. Both states have adopted a water quality standard equivalent to EPA's standard for discharges of effluent with 2,3,7,8-TCDD.

The states have placed 12 of the mills on the short list of violators of the Clean Water Act's Section 304(1), according to an attorney for the Northwest Pulp and Paper Association. Section 304(1) is a new section of the Water Act designed to control toxic water pollution.

According to the pulp and paper industry in the Northwest, the federal standard for 2,3,7,8-TDCC of 0.013 parts per quadrillion is stricter than the health risks warrant. "When EPA calculated the number they didn't have site-specific numbers on fish. What we are saying is that we can bring forth good scientific evidence for a lower standard," Morrison said.

#### General Policy

## HOUSE OPENS INQUIRY OF INSPECTOR GENERAL, QUESTIONING PRACTICES IN EPA INVESTIGATIONS

House subcommittee leaders said Dec. 6 that they have launched an investigation into the Environmental Protection Agency Office of Inspector General, citing allegations of misdirected federal money, questionable investigative practices, and the failure to pursue crooked contractors.

Reps. John D. Dingell (D-Mich) and Thomas J. Bliley (R-Va), the chairman and ranking minority member of the House Energy and Commerce Subcommittee on Investigations and Oversight, said they had received allegations that the IG office has "failed to aggressively pursue unscrupulous superfund contractors."

A House aide would not elaborate on the charges but said the investigation was just beginning.

In a letter to EPA Inspector General John C. Martin, the congressmen requested numerous documents dating back to 1984 involving IG investigations. The request also asked to review IG staff work documents.

The aide said that this "is a major investigation" of the operations of EPA's IG office. The aide could not predict when the inquiry would be concluded.

The aide also confirmed that the inquiry will delve into charges that Martin acted improperly when he was investigating whether EPA Administrator William K. Reilly improperly intervened in a dispute over North Carolina's regulation of hazardous waste.

An EPA source told BNA that Martin met with Reilly before launching the inquiry into the North Carolina case. Martin allegedly cleared Reilly of impropriety.

12-22-89

Environment Reporter 0013-9211/89/\$0+.50

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Reps. John D. Dingell (D-Mich) and Thomas J. Bliley (R-Va), the chairman and ranking minority member of the House Energy and Commerce Subcommittee on Investigations and Oversight, said they had received allegations that the IG office has "failed to aggressively pursue unscrupulous superfund contractors."

A House aide would not elaborate on the charges but said the investigation was just beginning.

In a letter to EPA Inspector General John C. Martin, the congressmen requested numerous documents dating back to 1984 involving IG investigations. The request also asked to review IG staff work documents.

The aide said that this "is a major investigation" of the operations of EPA's IG office. The aide could not predict when the inquiry would be concluded.

The aide also confirmed that the inquiry will delve into charges that Martin acted improperly when he was investigating whether EPA Administrator William K. Reilly improperly intervened in a dispute over North Carolina's regulation of hazardous waste.

An EPA source told BNA that Martin met with Reilly before launching the inquiry into the North Carolina case. Martin allegedly cleared Reilly of impropriety.

12-22-89

Environment Reporter 0013-9211/89/\$0+.50

#### IN THE STATES

#### Georgia

## DNR APPROVES LESS STRINGENT STANDARDS FOR DIOXIN, PCBs IN INDUSTRIAL WASTE WATER

ATLANTA—(By a BNA Staff Correspondent)—Georgia Dec. 6 approved new industrial waste water standards for polychlorinated biphenyls and the most dangerous of the dioxins that are significantly less stringent than levels approved just six weeks ago.

The action, approved unanimously by the board of directors of the state's Department of Natural Resources, was taken following advice from the state Attorney General's Office that the earlier standards, especially the standard on 2,3,7,8-tetrachloro-dibenzo-p-dioxin, could not withstand a legal challenge from the pulp and paper industry in Georgia. Industry representatives claimed the more stringent dioxin standard might cost some of the state's five such plants \$100 million each to meet.

The old standard, 0.013 parts per quadrillion in stream flow water, was based on a recommendation from the Environmental Protection Agency and would have reduced the chance of getting cancer over a lifetime of exposure to 1 in 1 million (20 ER 1308). The new standard is 7.2 ppq. No estimate of the cancer risk over a lifetime of exposure was available for the new standard, which was adopted on a proposed emergency rule basis and took effect immediately.

The board also followed the advice of Dr. Vernon N. Houk,

assistant surgeon general and director of the Center for Environmental Health and Injury Control, part of the Atlanta-based Centers for Disease Control, who reviewed an alternate proposal by the paper industry. Houk told DNR board members that EPA and other federal regulatory agencies are using outdated research and that their standards are too stringent. In a Nov. 27 letter to DNR Commissioner J. Leonard Ledbetter, he described the new standards as "reasonable" limits.

According to Houk, 7.2 ppq for dioxin "probably overestimates" the human health risk of dioxin exposure, but can be justified based on current research. According to a DNR memorandum, each of Georgia's five pulp and paper plants can comply with the new standard without making any changes in their waste water controls.

Also, according to a DNR memo, at a meeting between representatives of EPA and DNR, Georgia Assistant Attorney General Robert S. Bomar said EPA research documents on which the old dioxin criterion was based would not be admissible as evidence in state court should the paper industry sue.

EPA experts cannot be subpoenaed to testify in state court, DNR added. "Without the necessary EPA documents and EPA experts," the memo said, the state "does not anticipate being able to defend the standard." Industry representatives had argued that the old standards were not based on "good science."

The new standard on permissible levels of polychlorinated biphenyls in plant waste water is 0.00045 microgram per liter. The old standard was 0.000045 microgram per liter.

Ledbetter said he did not know whether EPA would approve the new standards.

Technical Contact: Dr. Zvi Blank, Remediation Technology, Inc., 273 Franklin Road, Randolph, NJ 07869, (201) 361-8840.

Reference Cited: Zvi Blank et al., "LEEP – Low Energy Extraction Process: New Technology to Decontaminate PCB-Contaminated Sites," August 1989.

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## SOIL DECONTAMINATION BY FROTH FLOTATION

When soil is contaminated with organics, the organics tend to concentrate on the clay/silt particles. These particles have very large surface areas relative to their volumes, and also have surface properties that encourage organic adsorption. BioTrol, Inc. has developed a flotation process that scours contaminants from the surface of sand and larger particles and also concentrates clay/silt fractions. This soil washing technology can significantly reduce the volume of contaminated soil that requires additional treatment by a process such as incineration.

#### THE TECHNOLOGY

The objective of BioTrol's soil washing system is to separate highly contaminated clay and silt particles from larger, uncontaminated particles such as sand and gravel. This is accomplished in a treatment system shown in Figure 13.

Excavated soil is first screened to remove debris larger than one-half inch in diameter. The soil is then slurried with water and again screened to remove particles larger than 14 mesh. The minus 14 mesh material is next processed in a flotation cell that removes hydrophobic components in a froth; the underflow from this cell passes to a multistage, countercurrent attrition/classification circuit. The purpose of the circuit is two-fold: (1) to scrub contaminants from the surface of sand particles, and (2) to segregate clay and silt particles from the sand. Washed sand particles leaving the attrition/classification unit are dewatered and may be backfilled. Contaminated clay and silt particles that are entrained in the washwater are subsequently processed in a dewatering system.

Dewatering of froth from the flotation cell and clay and silt from the attrition/classification circuit begins in a thickener where particulates are concentrated by flocculation and sedimentation. After further dewatering, the fines stream and associated organic contaminants can be treated further by biodegradation, incineration, stabilization, or offsite disposal. Depending on the size distribution of the original contaminated soil, the volume of residue requiring further treatment is reduced significantly—BioTrol reports typical clay/silt residues of 17 to 23% of the original soil volume.

**EXCAVATE** FEED SOIL + 1/2" DEBBIS **SCREEN** WATER AQUEQUS SLURRY BIOREACTOR + 14 MESH DEBRIS WATER **SCREEN** FROTH **FROTH** THICKENING **FLOTATION** SLURRY ATTRITION/ FINES CLASSIFICATION CLAY, AND CIRCUIT **ORGANICS** SAND WATER **DEWATERING** DEWATERING WASHED SOIL CONTAMINATED TO BACKFILL **FINES** Source: Adapted from S.B. Valine. FIGURE 13 **BLOCK FLOW DIAGRAM OF BIOTROL SOIL WASHING SYSTEM** 

Contaminated water leaving the dewatering units and the thickener is further processed in a biological treatment unit consisting of a multicell, submerged, packed-bed reactor. Influent water is heated if necessary, appropriate nutrients are added, and pH adjustments are made to facilitate biological removal of the organic contaminants. Treated wastewater is recycled to the soil slurrying unit for reuse.

THE HAZARDOUS WASTE CONSULTANT

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#### **ECONOMICS**

Preliminary economic analyses indicate that soil washing costs for a site containing 30,000 cubic yards of contaminated soil would range from \$65 to \$75 per cubic yard. This assumes a soil processing rate of 15 cubic yards per hour.

#### STATUS OF DEVELOPMENT

BioTrol has constructed a mobile soil washing pilot plant capable of processing 500 pounds per hour of contaminated soil. The pilot plant includes a multicomponent feed system, mixing trommel, vibrating screens, froth flotation cells, attrition machines, spiral classifiers, hydroclones, and dewatering equipment. A separate pilot-scale biological treatment unit is used to treat contaminated water from the soil washing system.

The pilot soil washing system has been used to treat contaminated soil at a wood preserving site. Removal rates for pentachlorophenol ranged from 90 to 95%; removal rates for polycyclic aromatic hydrocarbons averaged greater than 95%. Approximately 77% of the feed material was recovered as washed soil; oversized material (plus 14 mesh), consisting primarily of woody debris, constituted 11% of the original feed; and contaminated silt/clay sludge amounted to 12% of the feed.

Technical Contact: Steven B. Valine, BioTrol, Inc., 11 Peavey Road, Chaska, MN 55318, (612) 448-2515.

References Cited: S.B. Valine et al., "Soil Washing System for Use at Wood Preserving Sites," presented at the Air and Waste Management Association's International Symposium on Hazardous Waste Treatment Bio-systems for Pollution Control, February 20-23, 1989, Cincinnati, Ohio.

S.B. Valine et al., "Development of a Soil Washing System," presented at the 44th Annual Purdue Industrial Waste Conference, May 9-11, 1989, West Lafayette, Indiana.

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## SOIL DECONTAMINATION BY SOLVENT EXTRACTION AND FROTH FLOTATION

Froth flotation is a process that is commonly used in the mineral beneficiation industry, but which has only recently been linked with a solvent extraction process to treat contaminated soils. The process, developed by MTARRI, Inc. (Golden, Colorado), provides an alternative to incineration, and can reduce the quantity of material requiring disposal by 95%.

#### THE TECHNOLOGY

Figure 14 shows a block flow diagram of MTARRI's soil washing process designed to remove organic con-

taminants from soil. The process begins with a feed preparation unit that reduces the size of the incoming soil to minus 20 mesh in order to facilitate subsequent mixing/extraction operations. Solids leaving the unit are mixed with water to produce a slurry containing about 20% solids.

The soil slurry is contacted with a mixture of polar and nonpolar solvents in three, countercurrent mixing stages designed to minimize the loss of solvent. A solvent:slurry ratio of approximately 0.015:1.0 has been used successfully to remove pesticide contaminants from soil. Spent solvent is separated from the aqueous slurry and routed to a distillation unit that recovers most of the solvent for recycle. Still bottoms, which contain some residual solvent along with organic contaminants, form one of the concentrated waste streams that is subsequently aggregated for incineration. The volume of this waste stream is typically less than one percent of the feed to the soil washing system.

Aqueous slurry leaving the solvent extraction unit contains some residual solvent, along with small amounts of residual organic contaminants. The slurry is mixed with flotation reagents, such as caustic, silicate, and organic surfactants, which change the surface properties of the soil particles and release any weakly bound organic contaminants. When processed in a flotation cell, hydrophobic organics, along with significant quantities of heavy metals, are removed from the soil in the form of a froth. The froth is skimmed from the flotation cell, and flows to a solid/liquid separation system that employs flocculation, thickening, and filtration to reduce water content. Filter cake from this system contains approximately 35% solids and is typically less than 4% of the contaminated soil fed to the plant. The filter cake is aggregated with other wastes for incineration. Water from the froth dewatering system is recycled directly to the feed preparation unit.

Underflow from the froth flotation cell is also processed in a solid/liquid separation system consisting of flocculation, thickening, and filtration. The resulting clean solids contain about 35% water and are suitable for backfilling. Water from this solid/liquid separation step is treated by activated carbon adsorption and vapor compression distillation prior to recycle. Spent carbon from the treatment system is the third waste stream aggregated for incineration.

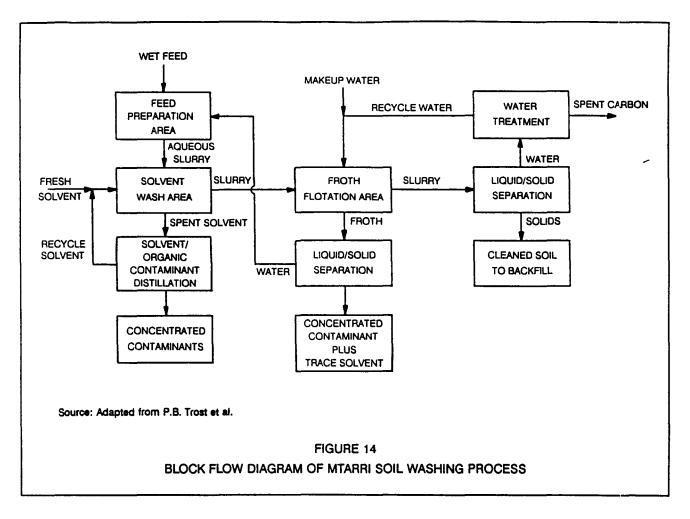
After aggregation, the energy content of the wastes is sufficient to provide for self-sustaining combustion in a fluidized bed incineration unit.

Although the solvent extraction/froth flotation system is primarily designed to remove organic contaminants from soil, significant removals of heavy metals have also been observed. This appears to result from the adsorption of metallic hydroxides to organic molecules removed in the flotation process.

November/December 1989

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THE HAZARDOUS WASTE CONSULTANT



#### **ECONOMICS**

A preliminary cost estimate has been prepared for a soil washing system capable of processing 950 tons per day of contaminated soil. Capital costs are estimated to total \$19.3 million, which, when amortized over a total of 600,000 tons of contaminated soil, amounts to \$32/ton (±20%). Operating costs are estimated to amount to an additional \$34/ton for a total unit processing cost of approximately \$66/ton.

#### STATUS OF DEVELOPMENT

Bench-scale demonstration runs have been conducted on a soil contaminated with various organic contaminants. These tests confirmed the operability of the process and provided information needed to produce the cost estimates cited above. The process is covered by U.S. Patent No. 4,783,263.

Technical Contact: Dr. Paul B. Trost, President, MTARRI, Inc., 1511 Washington Avenue, Golden, CO 80401, (303) 279-4255.

Reference Cited: P.B. Trost et al., "On Site Soil Wash-

ing—A Low-Cost Alternative," presented at the American Chemical Society meeting, May 2, 1989, Atlanta, Georgia.

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## KPEG CHEMICAL DECHLORINATION PROCESSES

Chemical dechlorination processes that use metallic sodium to treat PCB-contaminated materials are considered proven technologies. However, metallic sodium is difficult to handle and dangerous. To avoid these problems, at least two companies have developed alternative chemical dechlorination processes for treating halogenated aromatic compounds. A process developed by Galson Remediation Corporation (GRC – East Syracuse, New York) has been extensively tested on soils contaminated with PCBs, dioxins, and furans. A similar process developed by the General Electric Company (Schenectady, New York) has been used to decontaminate PCB oils.

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THE HAZARDOUS WASTE CONSULTANT

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## NORTHWEST TERMINAL - WOODTREATING COSTS OF INVESTIGATION AND CLEANUP

	DATE	EXPLANATION	AMOUNT
•	04/30/85	Chem-Security Systems - Lab fees	150.00
	07/09/85	NW Vacuum Truck Service - Soil removal	9,000.00
	07/29/85	Chem-Security Systems - Soil disposal	27,270.88
	08/08/85	Riedel - Obtain & analyze 3 soil samples	500.00
	12/05/85	Riedel - Obtain & analyze soil samples	18,741.55
		1985 Total	55,662.43
		1/2 Share	27,831.22
	03/24/86	Riedel - Wall demo & well installation	17,252.67
	05/16/86	Instrumentation NW - Well point materials	3,702.66
	06/10/86	OR DEQ - Hazardous waste disposal fee	3,500.00
	06/11/86	Century Envir Analyze water samples	2,739.50
	07/08/86	Century Envir Analyze water samples	1,800.00
	08/08/86	Riedel - Install 3 monitoring wells	4,452.81
	08/15/86	Concrete Coring - Warehouse floor holes	390.00
	08/25/86	Jack Each Construction - Relocate soil	1,465.00
	10/01/86	SRH - Review of cleanup alternatives	18,465.00
	01/26/87	Century West - Analyze 3/86 water samples	130.50
		1986 Total	53,898.14
		Cumulative	109,560.57
		1/2 Share	54,780.29
			04// 00/20
	11/09/87	SRH - Analyze water samples	2,810.53
		1987 Total	2,810.53
		Cumulative	112,371.10
		1/2 Share	56,185.55
	08/31/88	Ecova - Prepare cleanup work plan	6,000.00
		1988 Total	6,000.00
		Cumulative	118,371.10
		1/2 Share	59,185.55
			501.00.00
	03/02/89	PGE – Temporary power lines	4,763.04
	03/14/89	Ecova - Mob, excavation & well installation	160,000.00
	09/13/89	Friedman & Bruya - 8/23/89 Reactor samples	62.50
	10/04/89	Friedman & Bruya - 9/12/89 Reactor samples	170.00
	12/01/89	Friedman & Bruya - 10/6/89 Reactor samples	510.00
	12/01/89	Friedman & Bruya - 10/24/89 Reactor samples	515.00
	12/01/89	Friedman & Bruya - 11/2/89 Reactor samples	425.00
		1989 Total	166,445.54
		Cumulative	284,816.64
		1/2 Share	142,408.32
	02/15/90	Friedman & Bruya - 1/15/90 Soil pile samples	442.50
		1990 To Date	442.50
		Cumulative	285,259.14
		1/2 Share	142,629.57
		311010	

Remaining Ecora Contract amount = \$291,727.00

## NORTHWEST TERMINAL - WOODTREATING, COSTS OF INVESTIGATION AND CLEANUP

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DATE	EXPLANATION	AMOUNT
04/30/85	Chem-Security Systems - Lab fees	150.00
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	1987 Total	2,810.53
	Cumulative	112,371.10
	1/2 Share	56,185.5 <b>5</b>
08/31/88	Ecova - Prepare cleanup work plan	6,000.00
	1988 Total	6,000.00
	Cumulative	118,371.10
	1/2 Share	59,185.55
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12/01/89	Friedman & Bruya - 11/2/89 Reactor samples	425.00
	1989 Total	166,445.54
	Cumulative	284,816.64
	1/2 Share	142,408.32
02/15/90	Friedman & Bruya - 1/15/90 Soil pile samples	442.50 _ 66,017
08/14/90	Ecora Co., 1,244 1990 To Date	442.50
•	Cumulative	285,259.14
	1/2 Share	142,629.57
FUTURE CO	OST <b>S</b>	
	Remaining amount in ECOVA cleanup contract	291,727.00
	Change Order No. 4 (under negotiation)	96,905.00
	Change Order No. 5 (under negotiation)	20,500.00
	Total Future	409,132.00
•	Cumulative	694,391.14
	1/2 Share	347,195.57

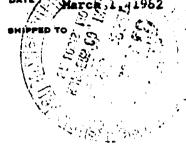
...INVOICE...

BOX-03117, ST. JOHNS STATION PORTLAND, OREGON 97203 PHONE: AVENUE 6-1611

IN ACCOUNT WITH

Woodtreating Chemicals Dept. Koppers Company 5137 Southwest Avenue St. Louis, Missouri 63110

VO. NO. D. O. NQ, CONT. NO. P. O. NO.



To invoice you for Facility Kental for the month of March, 1982 and for Handling Charge for the month of February, 1982 at the Time Oil Company Terminal, 12005 N. Burgard St., Portland, Oregon.

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I hereby certify that the above bill is correct and just; that payment therefor has not been received; that all statutory requirements as to American production and labor standards, and all conditions of purchase applicable to the transactions have been complied with; and that State and local taxes are not included in the amounts billed.

TIME OIL CO

Terminal Supt.

...INVOICE...

## TIME OIL CO.

12005 N. BURGARD, P. O. BOX-03117, ST. JOHNS STATION
PHONE: AVENUE 6-1611 PORTLAND. OREGON 97203

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IN ACCOUNT WITH

Woodtreating Chemicals Dept. Koppers Company 5137 Southwest Avenue St. Louis, Missouri 63110

VO. NO. D. O. NO, CONT. NO. P. O. NO.

To invoice you for Facility Kental for the month of March, 1982 and for Handling Charge for the month of February, 1982 at the Time Oil Company Terminal, 12005 N. Burgard St., Portland, Oregon.

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Filling Drums - 44 X 55 @ \$0.0671 2420 GAL

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I hereby certify that the above bill is correct and just; that payment therefor has not been received; that all statutory requirements as to American production and labor standards, and all conditions of purchase applicable to the transactions have been complied with; and that State and local taxes are not included in the amounts billed.

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...INVOICE...

## **ME OIL CO**

DATE April 1, 1982

IN ACCOUNT WITH

Woodtreating Chemicals Dept. Koppers Company 5137 Southwest Avenue St. Louis, Missouri 63110

.. U NU P 0 NO

To invoice you for Pacility Rental for the month of April, 1982 and for Handling Charge for the month of March, 1982 at the Time Oil Company Terminal, 12005 N. Burgard St., Portland, Oregon.

Facility Rental

\$ 615.00

LST Type Blended & Shipped -14101 Net Gls. @ \$0.134

188.95

Concentrates Blended & Shipped - boll Net Gls. @ \$0.0402

273.80

Filling Drums - 15 X 55 @ \$0.0671

55,36

\$1,133.11

I hereby certify that the above bill is correct and just that is ment therefor has not been receiving uniteraction of source an problem on and later standards and all conditions of purchase expenses the complete which, and that botte and cover lases are not included in the amounts billed

TIME OIL CO. Neil J. Gallagher

**A** 6" **▲** 7" NOTE - Tear Tape To Size Of Invoice

Audounts Payable Invoice Sticker 125619003 cacherta Ledger 3/8 170 743 2362 615 00 3/8 0362 Serial No 320 Net Amount Payable

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May 3, 198

IN ACCOUNT WITH

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Woodtreating Chemicals Dapt, Koppers Company 5137 Southwest Avenue St. Louis, Missouri 53110

U P AO

To invoice you for Facility Rental for the month of May 1982, for Handling Charge for the month of April 1982 and for additional charges for Facility Rental for the month of April 1982, at the Time Oil Company Terminal, 12005 N. Burgard St., Portland, Oregon.

Facility Rental - May 1982	\$ 650.00
LST Type Blended & Shipped - 165 Met Cls. @ \$0,1058	17.46
Concentrates Blended & Shipped - 2530 Net Cls. @ \$0.1498	378.49
Filling Drums - 49 X 55 @ \$0.1332	358.97
Additional Facility Rental - April	35,00
	\$1,440,42

I hereby on the full the above bill is correct and our that payment therefor has not been received, that all wasturory examiners of the can be to turn and at a standard out at conducting of purchase applicable to the transactions have been compared with and that Discrete and I at cases are constituted in the amounts billed.

TIME OIL CO.

Neil J. Gallagher

(1), Terminal Supt.

NOTE - Tear Tape To Size Of Invoice **KOPPERS** Ai Lourits Payable Invoice Sticker 125619003 0000051120 5/03/82 Amount Distributed Guaritity 318 170 743 2362 685 00 318 390 743 0362 755 00 Seliet No. Cash Discount Audieu By A 2 AUDIEU BY ADS-37W REV 9 50M 9-80 5 730 715 Net Amount Payable

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IN ACCOUNT WITH

Woodtreating Chemicals Dept. Ruppers Company 5137 Southwest Avenue St. Louis, Missouri 63110

To invoice you for Facility Rental for the month of June, 1982 and for Handling Charge for the month of May, 1982 at the Time Oil Company Terminal, 12005 N. Burgard St., Portland, Oregon.

Facility Rental

\$ 650.00

LST Type Blended & Shipped - 10079 Net Gis. @ \$0.1058

1066.36

Concentrates Blended & Shipped - 660 Net Gis. @ \$0,1498

161 12

F1110 1910 - 12 x 55 @ \$0.1332

161.17 \$1,970,40

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TIME OIL CO.

Neil J. Gallagher

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...INVOICE...

# TIME OIL CO. INV. Nº 17-2882

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Facility Rental	\$ 550,000
Lot Type Hended & Shopped - 12 there also 0.1056	449.70
Concentrates Stended & Strages - 1220 Set Sta. 3,1478	131.25
6.11 cas prima - 22 a 55 miles	151.17
Additive uniqued - 5 \$ .75	2.35
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title [erithal Supt.

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oate August 2, 1982

IN ALL CONT WITH

Woodtreating Chemicals Dept. Ruppers Company 5137 Couchwest Avenue ot. Louis, Missouri 63110

U , NU UJNE NO P O NO

To invoice you for Facility Rental for the month of August, 1982 and for Handling Charge for the month of July, 1982 at the Time Oil Company Terminal, 12005 N. Burgard St., Portland, Oregon.

facility Rental

\$ 650.00

LST Type Blended & Shipped - 10203 Net Gls. @ \$0.1058

1,079.47

Filling Drums - 6 X 55 @ \$0.1332

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TIME OIL CO.

Neil J. Gellagher

Terminal Sept

Terminal Supt.

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IN ACCOUNT WITH

Woodtreating Chemicals Dept. Koppers Company
5137 Southwest Avenue
5t. Louis, Missouri 63110

To invoice you for Pacility Kental for the month of September, 1982 and for Handling Charge for the month of August, 1982 at the Time Oil Company Terminal, 12005 M. Burgard St., Portland, Oregon.

Facility Rental	\$ 650.00
LST Type Bleaded & Shipped - 13961 Net Gis. @ \$0.1058	1,477.07
Concentrates Blended & Shipped - 3028 Net Gls. @ \$0.1498	453,59
Fifting Drums - 38 x 55 & \$0.1332	278.39
Additive Shipped - 30 Drums @ \$0.75	22,50
	\$2,001,55

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TIME OIL CO

Neil J. Callagher Terminal Supt.

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Woodcreating Chemicals Dept. Köppers Company 2137 Journwest Aveque Sc. Lowis, Missouri 63110

To invoice you for Pacility Mental for the month of October, 1982 and for Handling Charge for the month of September, 1982 at the Time Oil Company Terminal, 12005 N. Burgard St., Portland, Oregon.

Facility Rental

\$ 650.00

LST Type Blended & Shipped - 6965 Net Gls. 4 \$0.1058

736.90

Concentrates Blended & Shipped - 5060 Net Gls. @ \$0.1498

757.99

Filling Drums - 92 x 55 d \$0.1332

673.99

\$2,818.88

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ITME OIL CO IA

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Refl J. Carrier Supt.

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# **KOPPERS**

#### Interoffice Correspondence

То	D. F. Marion	From J. D. Hite
Location		Location
Subject_	Time Oil Toll Contract	Date <u>Cctober 14, 1982</u>
		tus of this renegotiated Time Oil tolling John Palmer's October 11 report at Time Oil.
	JDH:jw	John D. Hite

cc: K. E. Cogan
J. D. Palmer

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November 1, 1982

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IN ACCOUNT WITH

Woodtreating Chemicals Dept. Ruppers Company 5137 Southwest Avenue St. Louis, Missouri 63110

22 NG

To invoice you for Pacility Mental for the month of November, 1982 and for Handling Charge for the month of October, 1982 at the Time Oil Company Terminal, 12005 N. Burgard St., Portland, Oregon.

Facility Rental

\$ 650.00

Concentrates Blended & Shipped - 1045 Net Gls. @ \$0.1498

156.54

Filling Drums - 19 x 55 a \$0,1332

139,19 \$ 945,73

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TIME OIL CO,

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...INVOICE...

12005 N. BURGARD, P. O. BOX 03117. ST. JOHNS STATION PHONE AVENUE 6-1611 PORTLAND, OREGON 97203

SHIPPED TO

March 1, 1983 DATE

IN ACCOUNT WITH

Woodtreating Chemicals Dept. Koppers Company 5137 Southwest Avenue St. Louis, Missouri 63110

V13 110 CONT NO P. O NO.

To invoice you for Facility Kental for the month of March, 1983 and for Handling Charge for the month of February, 1983 at the Time Oil Company Terminal, 12005 N. Burgard St., Portland, Oregon.

Pacility kental

\$ 650.00

LST Type Blended & Shipped - 20,071 Not Gls @ \$0,1058

2,123.51

Concentrates Blended & Shipped - 1,265 Net Cls @ \$0.1498

189,50

**Filling Drums - 23 x 55 4 \$0.1332** 

168.50

I hereby certify that the above bill is correct and just; that payment therefor has not been received; that all statutory requirements us to American production and labor standards, and all conditions of purchase applicable to the transactions have been complicial with; and that State and local takes are not included in the amounts billed.

318- 170- 745

319 - 390 - 7113

650

,2481.51

TIME OIL CO

12005 N. BURGARD, P. O. BOX 03117, ST. JOHNS STATION PHONE: AVENUE 6-1611 PORTLAND, OREGON 97203

INV. NO. 4-1131

April 1, 1983

SHIPPED TO

#### IN ACCOUNT WITH

Woodtreating Chemicals Dept. Koppers Company 5137 Southwest Avenue 5t, Louis, Hissouri 63110

YO NO. U. O. NO, CONT. NO. P. O. NO.

To invoice out for Pacility Rental for the month of April, 1983 and for Handling Charge for the month of March, 1983 at the Time Oil Company Terminal, 12005 h. Burgard St., Portland, Oregon.

Fecility Kg., tel	\$	650.00
LST Type blunded & Shipped - 3575 Net Gls @ \$0.1058		378.24
Concentrate, plended & Shipped - 2145 Net Gls @ \$0.1498		321,32
1111114 Pruis - 67 x 55 @ \$0.1332		490,84
· · · · · · · · · · · · · · · · · · ·	\$1	.840.40

I haveby certify that the above bill is correct and just; that payment therefor has not been received; that all statutory requirements us to American production and labor standards, and all conditions of purchase applicable to the transactions have been complied with; and that State and local taxes are not included in the amounts billed.

Neil Wallis

Texu

Minal Manager

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P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447 - 2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233 PHONE (206) 285-2400

#### INVOICE 091868

DATE 03/06/86 REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:

KOPPERS COMPANY INC ATTN: DONALD F. MARION KOPPERS BUILDING ROOM 750 PITTSBURGH

657 60 123 27831.21 120

14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD.. PORTLAND, DREGUN.

#### **EXPENDITURES**

4/26/85 CHEM-SECURITY SYSTEMS

(LABORATORY ANALYSIS UF SOIL SAMPLES) 150.00

7/10/85 NORTHWEST VACUUM THUCK SERVICE-

(RELOCATING 242.76 TONS OF SOIL TO ARLINGTON) 9,000.00

7/29/85 CHEM-SECURITY SYSTEMS

(RECEIVING 243.30 TONS OF SOIL AT ARLINGTON) 27,270.98

8/8/85 ENVIRUNMENTAL EMERGENCY SERVICES

(OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)

12/31/85 ENVIRONMENTAL EMERGENCY SERVICES

(PRIMARY SAMPLING AND ANALYSIS PLUS REPORT) 18,741.55

55,662.43

#### COMMITTMENTS

3,500.00 DEQ PER OAK 240-102-065 \*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2) 25,000.00+

84,162.43

50Z =

42,081.21

\*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL

\$42,081.21

TOLS010500

Encl. 1

ACCOUNTS RECEIVA

K-64

000582

TIME 03 CO.

OX 24447 TERM. STATION - SEATTLE WA 98124-0447.

2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233.

PHONE (206) 235-2400

DEBIT MEMO 020190

DATE 04/17/37 REF. 04-03131 FER

CUSTOMER #: 03/05505623

ACCOUNT:

120 9

12699-07

KOPPERS COMPANY

Koppers Building - Room 750 Pittsburgh, PA 15219

ATTN: JAY STEBBINS

THIS IS AN ADDITION TO INVOICE # 091363 DATED MARCH 6, 1985 FOR \$ 42,031.21 TO CHARGE YOU FOR HALF OF EXPENDITURES, PER MUTUTAL AGREEMENT, IN REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD PORTLAND, OREGON.

12,699.07

COPIES OF THE ORIGINAL INVOICE (#09136%, 3/6/86, \$42081.21) AND THE UPDATED CHARGES FOR 5 54730.23 ARE ATTACHED.

INVOICE TOTAL \$12,699.07

TOLS010501

ORIGINAL

K-64

000583

# TIME OIL CO. P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447 2737 MEST COMMODORE WAY - SEATTLE WA 98199-1233 PHONE (206) 285-2400

INVOICE 056677

DATE 09/21/88 REF- 09-03116 CJC

CUSTOMER #: 03/05505623

ACCOUNT:

657 60 123 4405.27

KOPPERS COMPANY INC KOPPERS BUILDING ROOM 750 ATTN: BILL GIARLA PITTSBURGH PA 15219

TO CHARGE YOU FOR 1/2 THE FOLLOWING PWR MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N BURGARD RD, PORTLAND OREGON

EXPENDITURES
11/9/87 SRH-COLLECT AND ANALIZE
WATER SAMPLES

2810-53

8/31/88 ECOVA-PREPARE PENTA CLEANUP WORK PLAN

6000.00

8810.53

50%= 4405.27

4,405.27

INVOICE TOTAL

\$4,405.27

TOLS010502

K-64

ORIGINAL 000584

**INVOICE 091868** 

P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447 2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233 PHONE (206) 285-2400

DATE 03/06/86 REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:

KOPPERS COMPANY INC ATTN: DONALD F. MARION KOPPERS BUILDING ROOM 750 PITTSBURGH PA 15219 657 60 123 27831.21 120 9 14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, OREGON.

#### **EXPENDITURES**

4/26/85 CHEM-SECURITY SYSTEMS

(LABORATORY ANALYSIS OF SOIL SAMPLES) 150.00

7/10/85 NORTHWEST VACUUM TRUCK SERVICE

(RELOCATING 242.76 TONS OF SOIL TO ARLINGTON) 9,000.00

7/29/85 CHEM-SECURITY SYSTEMS

(RECEIVING 243.30 TONS OF SOIL AT ARLINGTON) 27,270.88

8/8/85 ENVIRONMENTAL EMERGENCY SERVICES

(OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)

12/31/85 ENVIRONMENTAL EMERGENCY SERVICES

(PRIMARY SAMPLING AND ANALYSIS PLUS REPORT) 18,741.55

55,662.43

#### COMMITTMENTS

DEQ PER DAR 240-102-065
\*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2)

3,500.00 25,000.00+

84,162.43

50% =

42,081.21

\*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL \$42,081.21

61

TOLS010503

**ORIGINAL** 

P.O.BOX 24447 TERM. STATION - SEATTLE NA 98124-0447
2737 NEST CONHODORE NAY - SEATTLE NA 98199-1233
DATE 03/06/86 PHONE (206) 285-2400 CUSTOMER #: 03/055056 ACCOUNT: KOPPERS COMPANY INC ATTN: DONALD F. MARION KOPPERS BUILDING ROOM 750 PITTSBURGH PA 15219 TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, DREGON. \* EXPENDITURES 4/26/85 CHEM-SECURITY SYSTEMS (LABORATORY ANALYSIS OF SOIL SAMPLES) 7/10/85 NORTHWEST VACUUM TRUCK SERVICE (RELOCATING 242.76 TONS OF SOIL TO ARLINGTON) 9,000.00 7/29/85 CHEM-SECURITY SYSTEMS (RECEIVING 243.30 TONS OF SOIL AT ARLINGTON) 27,270.88 8/8/85 ENVIRONMENTAL EMERGENCY SERVICES (OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES) 12/31/85 ENVIRONMENTAL EMERGENCY SERVICES (PRIMARY SAMPLING AND ANALYSIS PLUS REPORT) 18,741.55 COMMITTMENTS

DEQ PER QAR 240-102-065 RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2) 25,000.00+ 84,162.43 

61

TOLS010504

REMITTANCE COPY

PLEASE RETURN WITH YOUR PAYMENT

TOP 190 REV. B/B

**INVOICE 091868** 

P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447 2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233 PHONE (206) 285-2400

DATE 03/06/86 REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:

KOPPERS COMPANY INC
ATTN: DONALD F. MARION
KOPPERS BUILDING ROOM 750
PITTSBURGH PA 15219

657 60 123 27831.21 120 9 14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, OREGON.

#### **EXPENDITURES**

4/26/85 CHEM-SECURITY SYSTEMS
(LABORATORY ANALYSIS OF SOIL SAMPLES) 150.00
7/10/85 NORTHWEST VACUUM TRUCK SERVICE
(RELOCATING 242.76 TONS OF SOIL TO ARLINGTON) 9,000.00
7/29/85 CHEM-SECURITY SYSTEMS
(RECEIVING 243.30 TONS OF SOIL AT ARLINGTON) 27,270.88
8/8/85 ENVIRONMENTAL EMERGENCY SERVICES
(OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES
(PRIMARY SAMPLING AND ANALYSIS PLUS REPORT) 18,741.55

#### COMMITTMENTS

DEG PER DAR 240-102-065
\*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2)

3,500.00
25,000.00+
84,162.43

50% = 42.081.21

\*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL \$42,081.21

TOLS010505

000598 ORIGINAL

#### IN ACCOUNT WITH:

KOPPERS COMPANY INC. ATTN: JAY SEBBINS KOPPERS BUILDING, ROOM 750 PITTSBURGH, PA 15219

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING EXPENDITURES PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD, PORTLAND, OR:

04/26/85	Chem-Security Systems (Laboratory analysis of soil sample)	\$ 150.00
07/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	\$ 9,000.00
07/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	\$ 27,270.88
08/08/85	Environmental Emergency Services (Sampling and analysis)	\$ 500.00
12/05/85	Environmental Emergency Services (Well drilling, sampling & analysis)	\$ 18,741.55
03/24/86	Environmental Emergency Services (Sandblast and demolish wall; install wells)	\$ 17,252.67
05/16/86	Instrumentation Northwest (Monitoring well materials)	\$ 3,702.66
06/11/86	Century West Engineering (Develop and sample wells)	\$ 2,739.50
06/11/86	Department of Environmental Quality (Per OAR 240-102-065)	\$ 3,500.00
07/08/86	Century Environmental Sciences (sampling wells)	\$ 1,800.00
08/08/86	Riedel Environmental Services, Inc. (Sampling and analysis)	\$ 4,452.81
08/25/86	Jack Eatch Construction Co. (Relocate soil and dispose of concrete wall)	\$ 1,465.00
09/10/86	Concrete Coring Co. (Cut holes through concrete floor of warehouse)	\$ 390.00
10/24/86	SRH Associates, Inc. Investigation of pentachlorophenol as per contractdated 08/14/86	t \$ 18,465.00
01/26/87	Century West Engineering (Well sampling and analysis) TOLS010506	\$ 130.50 \$109,560.57
•	50%	= \$ 54,780.28
	INVOICE TOTAL	\$ 54,780.28







# OIL COMPAN

2737 WEST COMMODORE WAY P.O. BOX 24447, TERMINAL STATION SEATTLE, WASHINGTON 98199-1233 SEATTLE, WASHINGTON 98:24-0447

October 2, 1987

RECEIVED

OCT 5 1987

Keystone Environmental Resources Inc. Jim Campbell 436 7th Ave. Pittsburg, PA 15219

Environmental Resources

Dear Mr. Campbell:

This is in reference to our discussion regarding clean up costs at 12005 North Burgard in Portland, Oregon.

Enclosed are copies of the documents you wish to review.

- The Original invoice #091868 dated March 6, 1986 for \$42,081.21.
- A complete list of expenditures as of April 1, 1987.
- C. Billing for the additional charges of \$12,699.07 for expenses after the date of the original invoice.

Your cost for half the expenditure, per mutual agreement is \$54,780.28.

We appreciate your working with us and look forward to hearing from you at your earliest convenience.

Yours Truly.

TIME OIL CO.

É. Luckovich

Credit Manager

JEL: 1td

**Enclosures** 

0002B

TOLS010507

K-64

000587

TIME DIL CO. INVOICE 091868

P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447 - 2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233 PHONE (206) 285-2400

DATE 03/06/86 REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:

KOPPERS COMPANY INC ATTN: DONALD F. MARION KOPPERS BUILDING ROOM 750 PITTSBURGH PA 15219 657 60 123 27831.21 120 9 14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., FORTLAND, OREGON.

#### EXPENDITURES

4/26/85 CHEM-SECURITY SYSTEMS
(LABORATORY ANALYSIS OF SOIL SAMPLES)

7/10/85 NORTHWEST VACUUM TRUCK SERVICE
(RELOCATING 242.76 TONS OF SOIL TO ARLINGTON)

7/29/85 CHEM-SECURITY SYSTEMS
(RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)

8/8/85 ENVIRUNMENTAL EMERGENCY SERVICES
(OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)

12/31/85 ENVIRONMENTAL EMERGENCY SERVICES
(PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)

18,741.55

#### COMMITTHEN'S

DEG FER DAR 240-102-065
#RIEDEL ENVIRONMENTAL SERVICES (ADMENUMENT 2)

3,500.00
25,000.00+
84,162.43

42,081.21

\*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

1NVOICE TOTAL \$42,081.21

TOLS010508

50% =

Encl. 1

K-64

**ACCOUNTS RECEIVA** 

000580

TIME OIL CO. EXPENDITURES IN REFERENCE TO PENTACHLOROPHENOL CLEAN UP COSTS AT 12005 NORTH BURGARD, PORTLAND, OR.

04/26/85	Chem-Security Systems (Laboratory analysis of soil sample)	\$ 150.00
07/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	\$ 9,000.00
07/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	\$ 27,270.88
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12/05/85	Environmental Emergency Services (Well drilling, sampling & analysis)	\$ 18,741.55
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05/16/86	Instrumentation Northwest (Monitoring well materials)	\$ 3,702.66
06/11/86	Century West Engineering (Develop and sample wells)	\$ 2,739.50
06/11/86	Department of Environmental Quality (Per OAR 240-102-065)	\$ 3,500.00
07/08/86	Century Environmental Sciences (sampling wells)	\$ 1,800.00
08/03/36	Rizdel Environmental Services, Inc. (Sampling and analysis)	\$ 4,452.81
08/25/86	Jack Eatch Construction Co. (Relocate soil and dispose of concrete wall)	\$ 1,465.00
09/10/86	Concrete Coring Co. (Cut holes through concrete floor of warehouse)	\$ 390.00
10/24/86	SRH Associates, Inc. Investigation of pentachlorophenol as per contract dated 08/14/86	\$ 18,465.00
01/26/87	Century West Engineering (Well sampling and analysis)	\$ 130.50 \$109,560.57
	Koppers Company share of costs = 50% =	\$ 54,780.28
Encl. 2	TOTAL DUE FROM KOPPERS =	\$ 54,780.28

TIME IL CO.
P.O.BOX 24447 TERM. STATION - SEATTLE NA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE NA 98199-1233
PHONE (206) 235-2400

DEBIT MEMO 02019(

DATE 04/17/31 REF. 04-03131 FE

CUSTOMER #: 03/05505621

ACCOUNT:

KOPPERS COMPANY

Koppers Building - Room 750 Pittsburgh, PA 15219

ATTN: JAY STEBBINS

120 9 12699.07

THIS IS AN ADDITION TO INVOICE # 091363 DATED MARCH 6, 1985 FOR \$ 42,031.21 TO CHARGE YOU FOR HALF OF EXPENDITURES, PER MUTUTAL AGREEMENT, IN REFERENCE TO CLEAN UP COSTS.AT 12005 NORTH BURGARD PORTLAND, OREGON.

12,699.07

COPIES OF THE ORIGINAL INVOICE (#09136%, 3/6/86, \$42081.21) AND THE UPDATED CHARGES FOR 5 54730.23 ARE ATTACHED.

INVOICE TOTAL \$12,699.07

TOLS010510

K - 64

000590

ORIGINAL

Department of Environmental Quality Attn: Business Office 811 S.W. Sixth Avenue Portland, GR \$7204

> TIME OIL CO. Attn: Fred Proby 2737 West Commodore Way Seattle, WA 98199-1233 TO:



FOR DEQ USE ONLY
Date Received:
Amount Received:
Check No.:

Number: HSRAF92-362 05/29/92

'JUN 1 000

L	JUN_1 RECO		
PERMIT NUMBER	ITEM OR REFERENCE	AMOUNT DUE	DATE DUE
	Reimbursement of DEQ Oversight Costs for the month of April 1992:	\$620.07	06/28/92
4	Per AGREEMENT dated July 5, 1991. CO	DIV	AUTH
	See attached schedules.		TRI
	If you have any questions regarding this invoice, PO contact Norm King at (503) 229-6941.		PRICE
	% 	DIST ATTACHED	REC SIG
	488-3-08-01-01-55 #916010	ATTACING	

NOTE: Please return pink copy of this invoice with your remittance to ensure proper cradit.

TOLS010511

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DEQ 55 - 11/8

TIME OIL COMPANY
PORTLAND, OREGON

Koppers Company, Inc. Forest Products Division Pittsburgs, Pa. 15219

### **KOPPERS**

Customer Number Customer's Order Number Invoice Number Our Order No. Invoice Date Shipped From Terms: Net 30 Days Via F.O.B. Collect

And Mail To

Prepaid Shipped To

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Koppers Company, Inc P.O. Box

Make Checks Payable To

Koppers Company, Inc. Forest Products Division

Sold To

Description

Amount

Seller represents that the goods or services covered by this involce have been produced or rendered in full compliance with the requirements of the Fair Labor Standards Act of 1938, as assended, including Section 12(A).

WPC-223 Rev. 4 10M 8-74 Printed in U.S.A.

Seller warrants that all goods or services furnished or supplied under this order were produced in full compliance with the Civil Rights Act of 1964. Executive Order 11246, and reisted Regulations as the same may have been amended.

80-461

SEE JNV-743-0033-4 of 3/12/79 To: Car- Wood Door to.

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MVOICE FILE 

Koppers Cor	npany, inc	
Forest Produ	icts Divisio	n
Pittshurah E	15210	

### **KOPPERS**

730 - 7 4	Customer Number	Customer's Order Number
Our Order No. 730 - 8118	Invoice Date (Topat)	Terms: Net 30 Days
Shipping Date 3/5/79	Shipped From Po ATLEMED ORE.	System 99
F.O.B.	OREGON	Collect ☐ Prepaid ☑

Make Checks Payable To

Koppers Company, Inc. Forest Products Division

And Mail To

Koppers Company, Inc. P.O. Box 360929 ← いかんしょう Pittsburgh, Pa. 15250

Sold To

Time Oil Co.
P.O. BOX 03117
St. JOHN'S STATION
PORTLAND DREGUN 79203

CAL - WOOD DOOR COMPANY 1.0. BOX 1656 SANTA ROSA, CA. 95463

Shipped To

TO CHARGE BACK FREIGHT CHARGES PER ASSACHED COPY OF SYSTEM 99 FREIGHT BILL NO. 2558569

Description

107,00

Amount

(SHIPPED DROER IN ERROR - NAS SET UP FOR WILL CALL BY CUSTOMER - BIL 8118)

2: -0.

Seller represents that the goods or services covered by this invoice have been produced or rendered in full compliance with the requirements of the Fair Labor Standards Act of 1938, as amended, including Section 12(A).

INVOICE - ORIGINAL

Seller warrants that all goods or services furnished or supplied under this order were produced in full compliance with the Civil Rights Act of 1984, Executive Order 11245, and releted Regulations as the same may have been amended.

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Koppers Com Forest Broduc Pittsburgh, Pa	2 Division			Invoi	се-Сору	
Invoice No. Our Order OrigDest.	PORTLAND, GREGON 743-0033-4 Customér 223-570-13 730-8113 CL of Trade Salesman 3470-874940-1127  CAL WOOD DODR OCMPANY P.O. BOX 1556 SANTA ROSA, CALIF, 95402  Date Shipped Date Invoiced Sales Office  Cal WOOD DODR OCMPANY P.O. BOX 1556 Cont.	3-12-79 3- <b>5</b> -79 5T,40U(S.)30	Koppers Forest P And Ma Koppers P. O. Bo	Checks P Company, roducts Div ail To Company, x 14287-F s, Mo. 63150	Inc. rision	0
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Seller represents that the goods or services covered by this invoice have been produced or rendered in full compliance with the requirements of the Fair Labor Standards Act of 1938, as amended, including Section 12(A).

FP-583 Rev. 1 30M 8-77

Printed in U.S.A.

Selier warrants that all goods or services furnished or supplied unde this order were produced in full compliance with the Civil Rights Ac of 1964, Executive Order 11246, and related Regulations as the sammay have been amended.

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### **KOPPERS** DATE ENTERED TO BE SHIPPED KOPPERS COMPANY, INC. WOOD TREATING CHEMICALS DEPT. ORDER 5137 SOUTHWEST AVE. ST. LOUIS, MISSOURI 63110 NUMBER 17157 PHONE (314) 772-2200 LOUISIANA - PACIFIC CORP. READING ROADS RED BLUFF CALIF with the terms and conditions of our quotation. In the absence of such a quotation your order is accepted SOLD TO Please communicate with us regarding any items not in accordance with your understanding referring in We greatly appreciate your busin INDICATED ROUTE TO BE SHIPPED FROM FREIGHT. ESTIMATED FREIGHT ACTUAL FREIGHT PACKAGE SIZE THIS - IS NOT 1 X 55 GA GAL AN INVOICE Koppers Company, Inc.

### **KOPPERS**

DATE ENTERED	TO BE SHIPPED
	3-8-84

SHIP

#### KOPPERS COMPANY, INC. WOOD TREATING CHEMICALS DEPT.

5137 SOUTHWEST AVE.

ST. LOUIS, MISSOURI 63 T10

ORDER NUMBER PHONE (314) 772-2200



We acknowledge and thank you for your order which has been entered on our records as shown on this

memorandum, and which is accepted in accordance with the terms and conditions of our quotation. In the absence of such a quotation your order is accepted subject to the terms and conditions on the reverse

Please communicate with us regarding gny items not in accordance with your understanding, referring in

all correspondence to our order number

Gentlemen:

2801 N. STATE ST. UKIAH, CALIF 95482

TO

(SAME AS & SHIP TO UNLESS INDICATED)

NO CHG

LOUISIANA PACIFIC CORP.

CONSOLICATED FRE WYS

DESCRIPTION

PREPAID

ST.LOUIS.MO.

DELIVERING CARRIER

CUSTOMER ORDER NO. UNIT PROD CODE PACKAGE SIZE 2 X 55 GAL

DR

WOLMAN PRESTAIN CEDAR BR

**THIS** IS NOT AN **INVOICE** 

Koppers Company, Inc.

### **KOPPERS**

DATE ENTERED	TO BE SHIPPED
	ASAP

KOPPERS COMPANY, INC.

5137 SOUTHWEST AVE.

ST. LOUIS, MISSOURI 63 NO

ORDER



NUMBER 15860

TO

SOLD

PHONE (314) 772-2200 LOTSIANA - PACIFIC CORP.

RED BLUFF , CALIF

ATTN. TIM DRURY

We acknowledge and thank you for your order which has been entered on our records as shown on this narandum, and which is accepted in accordance ith the terms and conditions of our quotation. In the obsence of such a quotation your order is accepted subject to the terms and conditions on the reverse

ase communicate with us regarding any items not in accordance with your understanding, referring in all correspondence to our order number.

TO We greatly appreciate your business. DATE SHIPPED TO BE SHIPPED FROM LOUIS MO CUST NO. ..... COMM. WHSE. CAR INITIALS & NO. CUSTOMER ORDER NO. SLMN. ESTIMATED FREIGHT ACTUAL FREIGHT TINU PROD CODE DESCRIPTION PACKAGE SIZE **THIS** GAL WOODTOX ADDITIVE 1 X 30 GA IS NOT AN INVOICE

Koppers Company, Inc.

**BILLING COPY** 

# TO BE SHIPPED

### KOPPERS

#### KOPPERS COMPANY, INC. WOOD TREATING CHEMICALS DEPT.

ST. LOUIS, MISSOURI 63110

5137 SOUTHWEST AVE. HILAN WOOD PRESERVERS PHONE (314) 772-2200 305 BRIDGE ST

KEMPTVILLE ONTARIO CANADA KOG 1JO

KOPPERS -NICKSON CANADA LTD 2000 ARGENTIA ROAD SUITE

SOLD (SAME AS a SHIP TO UNLESS INDICATED) MISSISSAUGA ONTARIO CANADA L5N 1P7

ÓRDER NUMBER 1656

We acknowledge and thank you for your order which has been entered on our records as shown on this memorandum, and which is accepted in accordance with the terms and conditions of our quotation. In the absence of such a quotation your order is accepted subject to the terms and conditions on the reverse side hereof.

Please communicate with us regarding any items not in accordance with your understanding, referring in all correspondence to our order number.

We greatly appreciate your business.

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Koppers Company, Inc.

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DATE ENTERED TO	BE SHIPPED	)-84 v		COMPANY, IN		CH	
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BILLING COPY

Koppers Company, Inc.

## **KOPPERS**

DATE ENTERED	TO BE SHIPPED
	2-16-84

SOLD TO

(SAME AS A SHIP TO UNLESS INDICATED)

## KOPPERS COMPANY, INC. WOOD TREATING CHEMICALS DEPT.

ST. LOUIS, MISSOURI 63110

LOUISIANA PACIFIC CORPHONE (314) 772-2200

P.O. BOX 629 TO

RED BLUFF CALIF 96080 ORDER NUMBER

Gentlemen:

We acknowledge and thank you for your order which has been entered on our records as shown on this memorandum, and which is accepted in accordance with the terms and conditions of our quotation. In the absence of such a quotation your order is accepted subject to the terms and conditions on the reverse side hereof.

Please communicate with us regarding any items not in accordance with your understanding, referring in all correspondence to our order numbers

We greatly appreciate your business

DELIVERING CARRIER

ROUTE TO BE SHIPPED FROM F.O.B. PREPAID ST.LOUIS, MO. NET

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Koppers Company, Inc.

Mc pa Dow Dorker

Kuppers Company, Itic. Forest Products Division Fittsburgh, Pa. 15219

## **KOPPERS**

Customer's Order Number Customer Number vaice Number 730-7007-4 ir Order No. invoice Date Terms: Net 30 Days 730-8118 5-2-79 Shipped From upping Date 3-5-79 PORTLAND, OREGON Collect PORTLAND, OREGON Prepaid X Make Checks Payable To

Koppers Company, Inc. Forest Products Division

And Mail To

Shipped To

Koppers Company, Inc. P.O. Box **ОВОДО** 14287-F 经会员包括日本国际公司

ST.LOUIS,MO.

Sold

TIME OIL COMPANY P.O. BOX 03117 ST. JOHN'S STATION PORTLAND, OREGON 79203 CAL - WOOD DOOR COMPAN' P.O. BOX 1656 SANTA ROSA, CA.

TO CHARGE BACK FREIGHT CHARGES PER ATTACHED COPY OF SYSTEM 99 FREIGHT BILL NO.

Description

107.00

Amount

(SHIPPED ORDER IN ERROR- WAS SET UP FOR WILL CALL BY CUSTOMER - B/L 8118

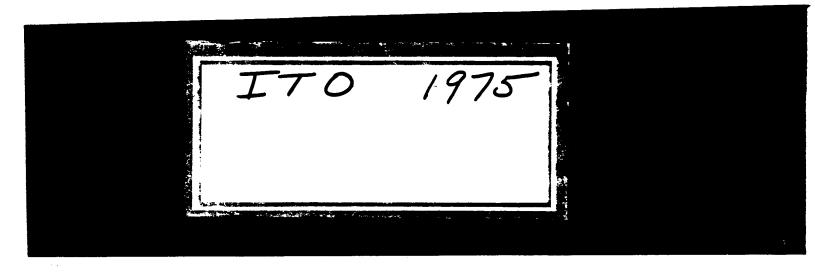
Teller represents that the goods or services covered by this invoice tive been produced or rendered in full compliance with the requirements of the Fair Labor Standards Act of 1908, as amended, including the LCAN. era Section 12(A)

A Table Garage Reports of the

Teller war aims that all goods or services furnished or supplied on this order were produced in full compliance with the Civil Rights P of 1964, for clive Order 11246, and related Regulations as the sa-may have been attended.

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#### WOOD TREATING CHEMICALS DEP

KOPPERS

2-19-75 2-20-75

5137 SOUTHWEST AVE. ST. LOUIS, MISSOURI 63110 PHONE (314) 772-2200 PO

ORDER O

01328

SHIP!

TIME OIL COMPANY 12005 N. BURGARD ROAD PORTLAND, OREGON

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BILLING COPY

CONSOLIDATED FREIGHTWAYS	INVOICE ORIGINAL FREIGHT BILL			2989-0
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A CO	SURE PROPER CREDIT, PLEASE ENCLOSE BY OF EACH BHL WITH RENITTANCE PLEASE MAIL CHECK TO ONSOLIDATED FREIGHTWAYS P. O. BOX 4488 PORTLAND, OREGON 97208			
LEASE REMIT ON THIS INVOICE WHEN PAYIN O ITEMIZED STATEMENT WILL BE SENT. ALWAYS ATT	IG Pay To: CONSO ACH P. O. Bo	LIDATED FREIGHT ox 4488 J. Oregon 97208	_	RIGINAL 1

318-7-743

MADE IN U.S.A.

TOLS010531

COPY

## WOOD TREATING CHEMICALS DEPT

TO BE SHIPPED

E SHIPPED

5137 SOUTHWEST AVE. ST. LOUIS, MISSOURI 63110, PHONE (314) 772-2200



SHIP TO TIME OIL COMPANY 12005 N. BURGARD ROAD PORTLAND, OREGON

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TO
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D FROM	ST. L	ouls, no.			DELIVER	ING CARRIER	DATE SHIPPED
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WOOD TREATING CHEMICALS DEPT.

WE ACKNOWLEDGE RECEIPT OF AND THANK YOU FOR YOUR ORDER

WTP-6 REV. 6/68



# WOODE, TREESTING CHEMICALS OFFT

POSE. 01328

#### TERMS AND CONDITIONS

IN CASE OF BREAKAGE OR LOSS IN TRANSIT HAVE NOTATION OF SAME MADE ON EXPENSE BILL BEFORE PAYING FREIGHT.

- 2. WHERE SHIPMENT OF THE MATERIAL REQUIRES USE BY SELLER OF CARBOYS, DRUMS, BARRELS OR OTHER RETURNABLE CONTAINERS, TITLE TO SUCH CONTAINERS SHALL REMAIN IN SELLER AND A DEPOSIT IN THE AMOUNT REQUIRED BY SELLER MUST BE MADE AT THE TIME THE GOODS ARE PAID FOR TO INSURE THE RETURN OF THE CONTAINERS TO POINT OF SHIPMENT, SUCH CONTAINERS MUST BE KEPT IN GOOD CONDITION AND MAY NOT BE USED FOR ANY PRODUCT OTHER THAN THAT SHIPPED THEREIN, AND MUST BE RETURNED WITHIN SIXTY (60) DAYS FROM DATE OF SHIPMENT. I. C. C. REGULATIONS REQUIRE THAT EMPTY DRUMS MUST HAVE FILLING AND VENT HOLES PROPERLY CLOSED AND EMPTY CARBOYS MUST BE THOROUGHLY, (COMPLETELY) DRAINED, ON SUCH CONTAINERS BEING SO RETURNED. A REFUND OF THE DEPOSIT WILL BE MADE.
- 3. DELIVERIES MAY BE SUSPENDED IN CASE OF WAR, RIOTS, FIRE, EXPLOSION, FLOOD, STRIKE, LOCKOUT, INJUNCTION, INABILITY TO OBTAIN FUEL, POWER, RAW MATERIALS, LABOR, CONTAINERS OR TRANSPORTATION FACILITIES, ACCIDENT, BREAKAGE OF MACHINERY OR APPARATUS, GOVERNMENTAL ACTION, NATIONAL DEFENSE REQUIREMENTS, OR OTHER CAUSES BEYOND THE CONTROL OF SELLER, PREVENTING THE MANUFACTURE OR SHIPMENT OF THE ARTICLE, OR PENDING TOTAL OR PARTIAL SUSPENSION OF THE MANUFACTURE OF THE ARTICLE OF THIS ORDER IS DEPENDENT.
- IN THE CASE OF BULK CARLOAD OR TANK CAR SHIPMENTS, SHIPPER'S WEIGHTS, CERTIFIED TO BY SWORN WEIGHMASTER, SHALL GOVERN.
- 5. SELLER SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE RESULTING FROM THE USE OF THE ARTICLE DESIGNATED ABOVE IN BUYER'S MANUFACTURING PROCESSES, OR IN COMBINATION WITH OTHER SUBSTANCES. CLAIMS ON ACCOUNT OF WEIGHT, QUALITY, LOSS OF OR DAMAGE TO SAID GOODS SHALL BE MADE IN WRITING AS PROMPTLY AS POSSIBLE, AND SELLER'S LIABILITY FOR DAMAGES SHALL IN NO EVENT EXCEED THE PURCHASE PRICE OF THE PARTICULAR DELIVERY WITH RESPECT TO WHICH SUCH DAMAGES-ARE CLAIMED.
- 6. ANY TAX OR GOVERNMENTAL CHARGE INCREASING THE COST TO SELLER OF PRODUCING, SELLING, OR DELIVERING THE ARTICLE HEREIN SPECIFIED, OR OF PROCURING MATERIALS USED THEREIN, AND LAND TAX PAYABLE BY THE SELLER BECAUSE OF THIS SALE, SUCH AS SALES TAX, USE TAX, RETAILERS OCCUPATIONAL TAX, GROSS RECEIPTS TAX, MAY, AT SELLER'S OPTION, BE ADDED.

ANY WOREASE IN FREIGHT RATES PAID BY SELLER ON SHIPMENTS COVERED BY THE ORDER HEREBY ACKNOWLEDGED, MAY, AT SELLER'S OFTION, BE ADDED TO THE PRICE OF MATERIAL SHIPPED UNDER SAME.

SAME
AD HOUGH PENTACHLOROPHENO OR SODIUM PEMPACHMOROPHENATE AND ITS FORMULATIONS
ARE NO MORE TOXIC THAN MANY CHEMICALS IN INDUSTRIAL USE TODAY, CARE SHOULD BE TAKEN
IN HANDLING TO AVOID HARMFUL EFFECTS TO WORKMEN THE BUYER SHALL INDEMNIFY AND
PROTECT HE SELLER AGAINST ANY AND ALL CLAIMS MADE BY THE BUYER'S EMPLOYEES ON ACCOUNT
OF ALLEGED INJURIES, RESULTING-FROM BUYER'S USE OF SUCH MATERIALS.

REFECTO LABELS AND LITERATURE FURNISHED BY SELLER FOR SAFE HANDLING DATA.

MAR 5

WE ACCHONISDES RECEIPT OF AND THAME YOU FOR

RANDUM is so selected that a SM of Lading has been issued and is not the Original SM of Lading, nor a copy or duplicitie, severing the property named berein, and is intended solely for filling or record.

RECEIVED, ambjest to the examinations and tariffs in effect on the date of the receipt by the carrier of the property described in the Original SM of Lading,

DATE ENTERED TO BE SHIPPED 2~1)~75

Coarton Te and Destination

Time out company 12005 H. BURGARD NOAD PORTLAND, ORECOM

SHIPPERS 01328 DATE SHIPPED CARRIER

FROM: W					т.	CORS			DELIVER	NG CARRIER			
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the consigner sh. SIGNATURE OF CONSIGNOR	en I of Gondinon half sign the follow	s of applicable	te but of tadin; nt: The carries	g, if this shipmout r shall not make d charges,	Myery of this :	tred in the seasigne shipment without pa	e without recourse on syment of freight and	the sonugner, all other lawful	Charges Advanced S		(The sign	ature here a the amount p	repaid.)
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TO BE SHIPPED DATE ENTERED 2-13-75

SHIPPERS 01328

DATE SHIPPED

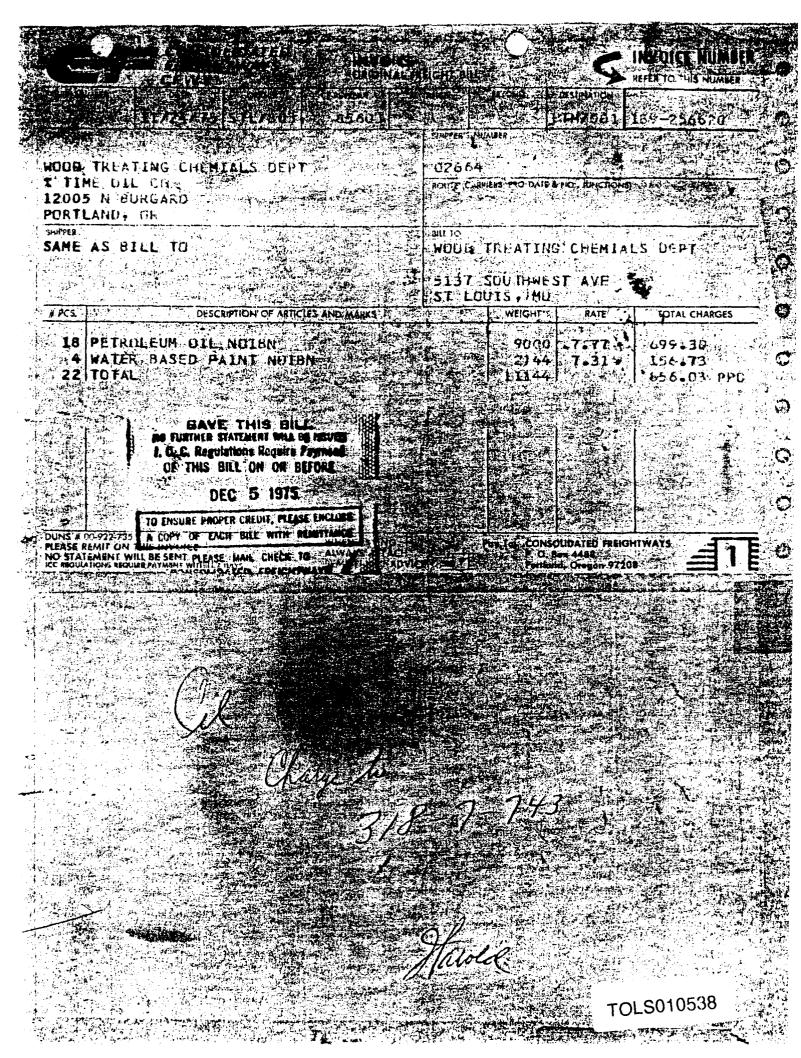
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#### WOOD TREATING CHEMICALS DE

17/24 25/755137 SOUTHWEST AVE. ST. LOUIS, MISSOURI 63110 PHONE (314) 772-2200

ORDER NUMBER

WOOD TREATING CHEMICALS DEPT.

REX C/O TIME OIL COMPANY
12005 N. BURGARD PORTLAND, OREGON 97203

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ST.LOUIS, MISSOURI DELIVERING CARRIER CONSOLIDATED FREIGHTWAYS 10-24-75 F.O.B. FREIGHT PREPAID COMM WHISE CAR INITIALS & NO. CUSTOMER ORDER NO. ESTIMATED FREIGHT **ACTUAL FREIGHT** UNIT PACKAGE SIZE B/O DESCRIPTION PETROSET II 18X55 GAL DR ~ LB (460# NET/DR) SAGEBRUSH GREEN POLE COLOR GAL 4X55 GAL DR COATING FOR ANSTRIK POLES. TRIEMS AND CONDITIONS. NOTWITHSTANDING ANY CONTRARY OR INCONSISTENT CONDITIONS THAT MAY BE EMBODIED IN PURCHASE ORDER, WE ACCEPT THIS ORDER, SUBJECT TO THE PRICES, TERMS AND CONDITIONS OF THE CONTRACT SETWEEN US I WHICH THIS ORDER IS PLACED, ON IF MO SUCH CONTRACT EXISTS, IT IS ACCEPTED AT OUR REGULAR SCHEDULED PRICE AND TER EFFECT ALL THE TIME OF SHIPMENT AND SUBJECT TO THE CONDITIONS PRINTED ON THE REVERSE SIDE HEREOF.

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WOOD TREATING CHEMICALS DEPT.

BILLING COPY

## WOOD TREATING CHEMICALS DE

**KOPPERS** 

DATE ENTERED TO BE SHIPPED

SOLD .

11/21/75 11/24-25/75 5137 SOUTHWEST AVE. ST. LOUIS, MISSOURI 63110 PHONE (314) 772-2200



WOOD TREATING CHEMICALS DEPT. KEX C/O TIME OIL COMPANY 12005 N. BURGARD PORTLAND, OREGON 97203

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WTP-6 REV. 6/68

THIS MEMO ANDUM is an acknowledgment that a ner a copy or displicate, covered DATE ENTERED TO BE SHIPPED SHIPPERS 02664 DATE SHIPPED FROM: WOOD TREATING CHEMICALS DEPT. ROUTE **DELIVERING CARRIER** AT ST. LOWS S. MI SSOURT . IDATED PREISHTMYS FREIGHT F.O.B. epaid SLMN. ESTIMATED FREIGHT CUSTOMER ORDER NO. COMM WHSE. CAR INITIALS & NO. **ACTUAL FREIGHT** DESCRIPTION QTY. UNIT PROD. CODE PACKAGE SIZE B/O 8262 34131 PETROSET !! 220 SAGEMENSK GREEK POLE COLOR COATING FOR AUSTRIE POLIS. SHIPPER WOOD TREATING CHEMICALS DEPT. Ree'd S AGENT apply in prepayment of the charges on the property described hereon. between two ports by a narrier by water, the law requires the re rate is dependent on value, shippers are required to state The agreed or declared value of the property is hereby spe Agent or Cashier Permanent post-office address of shipper: 5137 SOUTHWEST AVE., ST. LOUIS, MISSOURI 63110 Subject to Section 7 of Conditions of applicable bill of lading, if this ships the consigner shall sign the following statement: The earrier shall not mai the consigner : SIGNATURE OF CONSIGNOR charges. CARTONS DRUMS BAGS DESCRIPTION CAR SOLUTION (LIQUID WOOD PRESERVATIVES), NOT EXCEEDING 5% OF CHIORINATED PHENOL BY WEIGHT. CHLORINATED PHENOL PETROLEUM CHLORINATED PHENOL PETROLEUM WOOD PRESERVATIVES NOI LIQUID OR PASTE

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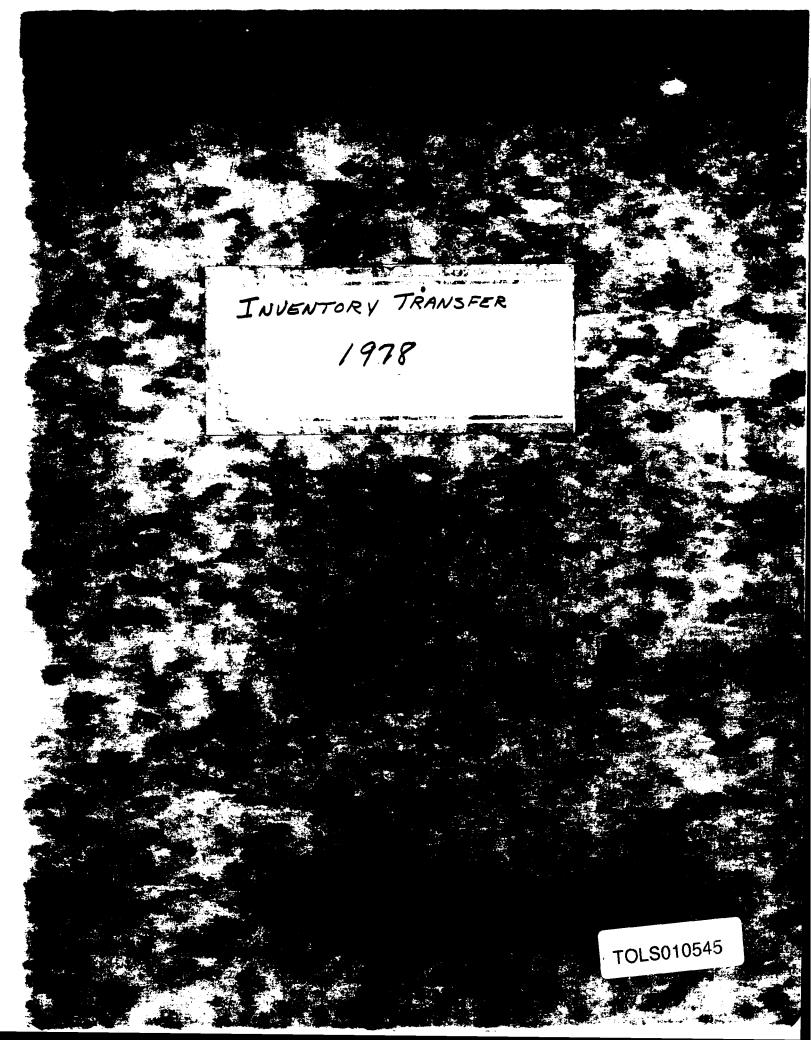
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## **KOPPERS**

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#### KOPPERS COMPANY, INC. WOOD TREATING CHEMICALS DEPT.

5137 SOUTHWEST AVE. ST. LOUIS, MISSOURI 63110 **ORDER** NUMBER

		KOPPERS COMPANY INC, "		772-2200
SHIP TO	•	C/O COTTON VALLEY SOLVENT	rs	
		HWY 7		
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SOLD TO

(SAME AS ... SHIP TO UNLESS INDICATED)

TO BE SHIPPED FROM T. LOUIS, MO.

201	ITF

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## Gentlemen:

We acknowledge and thank you for your order which has been entered on our records as shown on this memorandum, and which is accepted in accordance with the terms and conditions of our quotation. In the absence of such a quotation your order is accepted subject to the terms and conditions on the reverse side hereof.

Please communicate with us regarding any items not in accordance with your understanding, referring in all correspondence to our order number.

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Koppers Company, Inc.

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## KOPPERS COMPANY, INC. WOOD TREATING CHEMICALS DEPT.



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+ qn	UNIT	PROD. CODE	PACKAGE SIZE			DES	CRIPTIC	XI	UNIT PRICE	
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Koppers Company, Inc.

BILLING COPY

Coording To and Destination	12	005 N.	COMPANY BURGARD , OREGON	the property described below, in appearent good or terms of packages unknown), marked, consigned, on							ier, except as noted (contents and condition of con- dustriated as indicated below, which said carrier (the interest as missioning only persons or conjunctions in see to carry to its trade place of delivery of solid solidor carrier on the restrict is solid devicement. It is and proparty over all or only persons of study revolt to and proparty over all or only persons of study revolt to the terms and conditions of the Uniform Demonic & Cleanifications in effect on the death hereof, if this is public meter corner cleanification or tentify if this is o all the terms and conditions of the soul all of I deling.				
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PER *Signature	20	Agent next ob	ove is also intended	AGENT	ction 7 Cla	use herei	(स	PE	a cop	allo ?	Charges		propaid.)	<u> </u>	
			per: 5137 SOUTHY						-	Į j	Advances	18			

EFEC INTERNITION AND A copy or expression, surroring the property described in the Original SIN of Lading.

DATE ENTERED

-21-78

TO BE SHIPPED

TOLS010550

The Fibre Bazes used for this shipment conform to the specifications of forth in the hox maker's certificate thereon, and all other requirements of Consolidated Freight Classification.

7928

SHIPPERS NUMBER

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BILL OF LADINGS

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#### STRAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - Not Negotiable (Shipper's impriet in lies of stemp; set a part of bill of ling approved by the laterstate Commerce Commission.) RECEIVED, subject to the classifications and turiffs in effect on the date of the issue of this Bill of Lading, The Fibre Bexes used for this shipment custerm to the socifications set forth in the bex mater's certificate thereon, all other requirements of Consolidated Freight Classi-DATE ENTERED TO BE SHIPPED **6/2/73** SHIPPERS NUMBER Consign To CARRIER DATE stination SHIPPED FROM: WOOD TREATING CHEMICALS CO. ROUTE DELIVERING CARRIER CUSTOMER ORDER NO SLMN. COMM. WHISE CAR INITIALS & NO. ACTUAL FREIGHT QTY. HNIT PACKAGE SIZE PROD. CODE B/O DESCRIPTION 1650 **mi** -Salventa II 275 gal K II 460 hB 2 770 sal a Color Coats etrik Pele SHIPPER WOOD TREATING CHEMICALS CO. Rec'd 5 AGENT apply in prepayment of the charges on the property fescribed hereon. the shipment moves between two parts by a certier by woter, the low requires that the bill of ledding short state whether it is "carrier's or shippers weight." NOTE—Where the rate is dependent on value, Shippers are required in state specifically in writing the opened or declared value of the property. The agreed or declared value of the property is beenly secretically stated by the shipper to be not exceeding the property of the property in the shipper of the property is the shipper to be not exceeding Agent or Cashier Permanent post-office address of shipper: 5137 SOUTHWEST AVE., ST. LOUIS, MISSOURI 63110 Subject is Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consigner without recourse on the consigner, the consigner shell sign the following statement. The carrier shell not make delivery of this shipment SIGNATURE without payment of freight and all other leaving charges. OF CONSIGNOR (The signature bern acknowledges only the amount propaid.) Charges CARTONS BAGS DESCRIPTION DRUMS CLASS SQLUTION (LIQUID WOOD PRESÉRVATIVES), NOT EXCEEDING 5 % OF CHIORINATED PHENOL BY WEIGHT SQLUTION (LIQUID WOOD PRESERVATIVES), NOT EXCEEDING 5 % OF CHIORINATED PHENOL BY WEIGHT. CHLORINATED PHENOL PETROLEUM CHLORINATED PHENOL PETROLEUM WOOD PRESERVATIVES NOI LIQUID OR PASTE WOOD PRESERVATIVES NOI LIQUID OR PASTE POLYCHLOR AGRI INSECTICIDES OR FUNGICIDES INSECTICIDES OR FUNGICIDES AGRI NOI LIQUID INSECTICIDES OR FUNGICIDES AGRI NOI OTHER THAN LIQUID WEED OR TREE KILLING COMPOUNDS NOT

WTP - 6 REV. 6/69

<u> 30</u>

**XX** 14

ORIGINAL

Coumpounds Industrial Process Water Treating

GREASE OIL OR CAULKING GUNS HAND WITHOUT KITS OR TANKS

Solvent or Resin

Paint NOI

TOLS010553

TOTAL

1250

#### STRAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - Not Negotiable (Shipper's imprint in lieu of stemp; not a port of bill of leding approved by the interstate Commerce Commission.) RECEIVED, subject to the classifications and tariffs in effect on the date of the insue of this The Fibre Baxes and for this abjencet codern to the specifications set forth in the bex meter's certificate thereon, and all other requirements of Consolicated Freight Classification. THIS SHIPMENT BILLED ON DATE ENTERED TO BE SHIPPED 5-7-73 5-9-73 INVOICE NO. \_730 = \_714 4 SHIPPERS 62689 Conside To CARRIER Destination DATE MUNNELL & SHERRILL NUMBER Arcata, California FROM: WOOD TREATING CHEMICALS CO. ROUTE DELIVERING CARRIER NEWARK CA ΑT CUSTOMER PICKUP CUST NO TERMS FREIGHT F. O.B. CUSTOMER ORDER NO COMM. WHSE. CAR INITIALS & NO. ESTIMATED FREIGHT ACTUAL FREIGHT A-5658 UNIT PROD. CODE PACKAGE SIZE QTY. B/O DESCRIPTION 1375 GAL 25x55Gal Drums CLEAR END SEALER NET: 440 GR: 479 300 GAL # 28 1x300Gal TOTE BIN (SE CLEAR END SEALER NET: 2400 GR: 2880 345 GAL 1x345Gal TOTE BIN (RD) LIQUID NOXTANE SS1 NET: 3485 GR: 3965 GAL 610 2x305Gal TOTE BIN (90) LIQUID NOXIME SS1 #13-25 NET: 3085 GR: 3645 660 GAL 12x55Gal Drums LIQUID NOXTANE SS1 NET: 556 GR: 595 10/E 13-25 SHIPPER WOOD TREATING CHEMICALS CO. Rec's S AGENT apply in propayment of the charges on the property described hereon. " If the objective moves between two parts by a carrier by wells, the few requires that the bill of legiog shell state whether it is "corrier's or obligaer's weight. HOTE—Where the rate is dependent so white, shippers are required to atota specifically in untiling the decrease or declared value of the property is howely quantically stated by the shipper to be not succeeding till, for parts. Agent or Cashier Permanent post-office address of shipper: 5137 SOUTHWEST AVE., ST. LOUIS, MISSOURI 63110 Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consigner without rectures as the consigner, the consigner shall sign the following enterment. The carrier shall not make delivery of this shipment without payment of freight and all other leaves charges. OF CONSIGNOR (The signature here acknowledges only the empast propeid.) \* WEIGHT TANK CAR TRUCK CARTONS DESCRIPTION DRUMS BAGS CLASS SOLUTION (LIQUID WOOD PRESERVATIVES), NOT EXCEEDING 5% OF CHLORINATED PHENOL BY WEIGHT SOLUTION (LIQUID WOOD PRESERVATIVES), NOT EXCEEDING 5% OF CHLORINATED PHENOL BY WEIGHT CHLORINATED PHENOL PETROLEUM CHLORINATED PHENOL PETROLEUM WOOD PRESERVATIVES NOI LIQUID OR PASTE WOOD PRESERVATIVES NOI LIQUID OR PASTE 12 POLYCHLOR AGRI INSECTICIDES OR FUNGICIDES 7140 INSECTICIDES OR FUNGICIDES AGRI NOI LIQUID INSECTICIDES OR FUNGICIDES AGRI NOI OTHER THAN LIQUID TOLS010554 WEED OR TREE KILLING COMPOUNDS NO! GREASE OIL OR CAULKING GUNS HAND WITHOUT KITS OR TANKS WOOD SPLITTING PREVENTIVE COMPOUND 11975 TOTE BI WOOD SPLITTING PREVENTIVE COMPOUND 2880 TOTE BIRS 11255 PULYCHIOR AGRI INSECTICIDES OR FUNCICIDES 33250 TOTAL

WTP - 6 REV. 6/6 ORIGINAL

DATE ENTE	RECEIVED,	subject to the	ciessifice	- SHORT FORM	on the date of the	issue of this Bill	of Luding,	The Fibre Baxes us apocifications set forth and all other require	ed for this ship	ment conform to the	
6-8-73	6-	14-73		THIS SHIPM	MENT DI	LLED O	N. KV	fication.	SHIPPERS		
Cansign To			j	INVOICE NO.	730-	1047-	4		NUMBER	62694	
ond Destination	MUNNE	IL & SE					DATE SHIPPEI	6-14-73	CARRIER		
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CUSTOMER OR	DER NO. <b>5985</b>			· · · · · · · · · · · · · · · · · · ·	Sauced	1	CAR INITIALS & N	O. ESTIMATED FREIGH	HT ACTU	AL FREIGHT	
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330	GAI		RD	TOTE BIN #4		CLEAR E	ND SEALER	NET: 2640	GR:3120		
345	GAI	•	RD	TOTE BIN #39		LIQUID 1	NOXIANE S	51 NET: 3485	GR: 3965		
330	GAI	•	6xd	55 Gal Drums		ORANGE I	end seale	R NET: 440	GR: 479		
¿- <b>44</b> 0	GAI	8x55 Gal Drums				LIQUID AZIDE 200 NET: 516 GR: 555 (Hazardous Articles: CIASS "B" POISON)					
1100	GAL			c55Gal Drums	( AV	TIÓNID 1	NOXTANE SS	31 NET: 556	5 GR: 595		
SHIPPER 1	WOOD TRI	EATING CH	EMICALS	co.	11/4	and	$\sim$	1 .	Rec'd \$	te	
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Subject to Sec	tion 7 of Co consigner, the	enditions of or consigner sho	pplicable b	ili of loding, if this ships following statement The	east is to be deli	ivered to the com	his shipment		Par		
SIGNATURE OF CONSIGNOR				without payment of frei	ght and all other i	ewfal charges.	10	ergos anced \$	edges only	intere here acknowl- tim amount propoid.)	
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INVESTE & SHERRILL

Arcata, California

FROM TWO COLVERNING THEMICALS CO.

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GR:3965)	NET:3485	LIQUID NOXIANE SS1	#39	HED TOTE BIN	JÆ	- 345
ઉસ <b>ઃ 479</b> ્રે	NET: 440	DRANCE END SEALER	em em	6x55 Gal Dru	JAT .	330
	NET: 516	LIQUID AZIDE 200	: an	8x55 Gal Dru	JAD	440
-	NET: 536	(Hazardous Articles: LIQUID NOXIANE SS1	. em	20x55Gal Dru	JAD .	1100

TOLS010556 CLASS "5" POISON)

#### STRAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - Not Negotiable (Shipper's impriet in tion of stamp; not a part of hill of leding approved by the interstate Commerce Commission.) RECEIVED, subject to the classifications and turiffs in effect on the date of the-issue of this Bill of Luding, The Fibre Baxes used for this shipment conform to the specifications set Parth in the bex meter's certificate thereon, and all other requirements of Consolidated Freight Classification. DATE ENTERED TO BE SHIPPED 10-18-73 SHIPPERS 62681 Cossign To DATE Destination Munnell-Sherrill 16-18-73 P.O. Box 100 Arcata, Ca. FROM: WOOD TREATING CHEMICALS CO. ROUTE DELIVERING CARRIER ΑT Sierra Pacific CUST NO TERMS FREIGHT 001415 Net 30 Days Prepaid Berkeley, Ca. COMM. WHSE. CAR INITIALS & NO. CUSTOMER ORDER NO. ESTIMATED FREIGHT ACTUAL FREICHT QTY. UNIT PROD. CODE PACKAGE SIZE DESCRIPTION B/O **£** 2920 6/440 LB lbs Orange End Sealer **DRUMS** SHIPPER WOOD TREATING CHEMICALS CO. AGENT apply in prepayment of the charges on the property described hereon. "If the shipment moves between two parts by a carrier by water, the law requires that the bill of felling shell state whether it is "carrier's or shipper's weight." NOTE—Where the rate is dependent as value, shippers are required to state specifically in writing the agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding 34. per passes. Agent or Cashier Permanent post-office address of shipper: 5137 SOUTHWEST AVE., ST. LOUIS, MISSOURI 63110 Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignor without recourse on the consignor, the consignor shell sign the following statement. The carrier shell not make delivery of this shipment SIGNATURE Without payment of freight and all other lawful charges. Per (The signature here acknowledges only the amount prepaid.) Charges Advanced \$ OF CONSIGNOR CARTONS DRUMS BAGS DESCRIPTION CHLORINATED PHENOL PETROLEUM SOLUTION (LIQUID WOOD PRESERVATIVES), NOT EXCEEDING 5 % OF CHLORINATED PHENOL PETROLEUM OF CHLORINATED PHENOL BY WEIGHT. SOLUTION LUQUID WOOD PRESERVATIVES), NOT EXCEEDING 5 % WOOD PRESERVATIVES NOI LIQUID OR PASTE WOOD PRESERVATIVES NOI LIQUID OR PASTE POLYCHLOR AGRI INSECTICIDES OR FUNGICIDES INSECTICIDES OR FUNGICIDES AGRI NOI LIQUID

WTP - 6 REV. 6/69

6 Drums

ORIGINAL

INSECTICIDES OR FUNGICIDES AGRI NOI OTHER THAN LIQUID

GREASE OIL OR CAULKING GUNS HAND WITHOUT KITS OR TANKS

WEED OR TREE KILLING COMPOUNDS NOT

Wood Splitting Compound

TOLS010557

TOTAL 2920 LB

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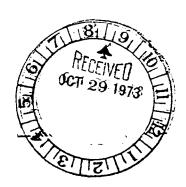
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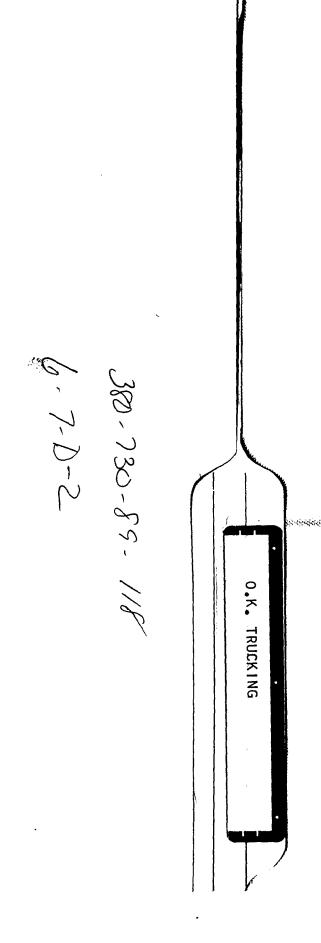
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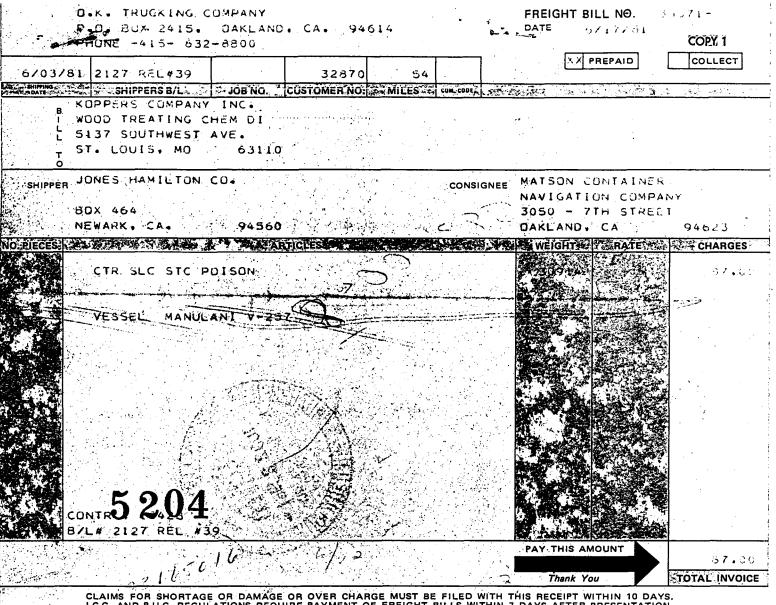
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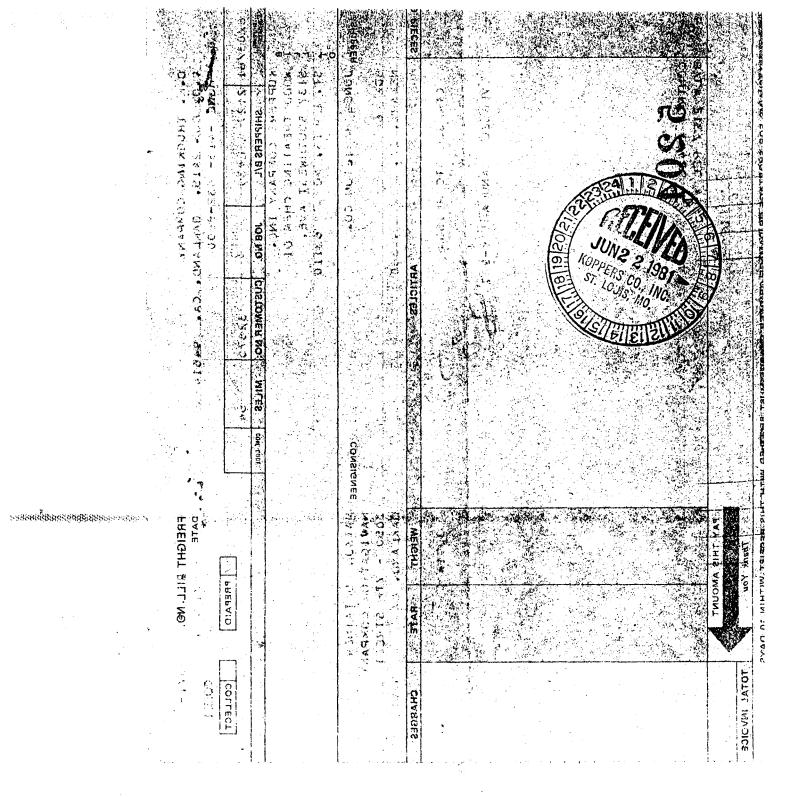
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					Thank	You	TOTAL INVOICE
	PIENE -415 32-8800  1 2127 RELITS SHIPPERSOL JOBNO. CO KOPPERS COMPANY INC. WOOD TREATING CHEM DI 5137 SOUTHWEST AVE. ST. LOUIS. MO 63110  JONES HAMILTON CO.  BOX 464 NEWARK. CA. 94560  ART  CTR SLC STC POISON  VESSEL MANULANI V-257	PHONE -415 32-8800  1 2127 REL 39 32870  SHIPPERSOL JOB NO. CUSTOMER NO.  KOPPERS COMPANY INC.  WOOD TREATING CHEM DI  5137 SOUTHWEST AVE.  ST. LOUIS. MO 63110  JONES HAMILTON CO.  BOX 464 NEWARK. CA. 94560  CTR SLC STC POISON  VESSEL MANULANI V-257  CONTR # 13428	PHINE -415- 32-8800  1 2127 RELETS 32-8800  1 2127 RELETS 32-8800  1 2127 RELETS 32-8800  1 2127 RELETS 32-8800  1 2127 RELETS 32-8800  1 2127 RELETS 32-8800  1 2127 RELETS 32-8800  54  SHIPPERS L. JOB NO. CUSTOMER NO. MILES  KOPPERS COMPANY INC.  WOOD TREATING CHEM DI 5137 SOUTHWEST AVE. 5T. LOUIS. MO 63110  JONES HAMILTON CO.  BOX 464 NEWARK. CA. 94560  ARTICLES  CTR SLC STC POISON  VESSEL MANULANI V-257	PICHE -415 JOHNO CUSTOMER ND 54 SHIPPERS OF JOHNO CUSTOMER ND MILES COM CONT KOPPERS COMPANY INC. WOOD TREATING CHEM DI 5137 SOUTHWEST AVE. 5T. LOUIS, MD 63110  DONES HAMILTON CO. CONS BOX 464 NEWARK, CA. 94560  CTR SLC STC POISON  VESSEL MANULANI V-257  CONTR # 13428	PICHE -415 32-8800  11 2127 REF 39 32870 54 SHIPPERS L JOB NO. CUSTOMER NO. MILES CON CONT.  KOPPERS COMPANY INC. WOOD TREATING CHEM DI 5137 SQUTHWEST AVE. 5T. LOUIS. MO 63110  JONES HAMILTON CO. CONSIGNEE  BOX 464 NEWARK. CA. 94560  CTR SLC STC POISON  VESSEL MANULANI V-257	PHENE -415 32-8800  1 2127 REN 32-8800  1 2127 REN 32-8800  SHIPPERSTY JOB NO. CUSTOMER NO. MILES COM LEGIT  KOPPERS COMPANY INC. WOOD TREATING CHEM DI 5137 SOUTHWEST AVE. 5T. LOUIS. MO 63110  JONES HAMILTON CO. CONSIGNEE MATSON C NAVIGATION BOX 464 NEWARK. CA. 94560  CTR SLC STC POISON  VESSEL MANULANI V-257  CONTR # 13428	P.O. BOX 2113 32-8800  1 2127 RELETT 32-8800  1 2127 RELETT 108 NO. CUSTOMER NO. MILES CON LOD!  SHIPPERSTIT. 108 NO. CUSTOMER NO. MILES CON LOD!  WOOD TREATING CHEM DI 5137 SQUTHWEST AVE.  ST. LOUIS, MO 63110  JONES HAMILTON CO. CONSIGNEE NAVIGATION COMPAN 3050 - 7TH STREET OAKLAND, CA  REWARK, CA. 94560  CTR SLC STC POISON  VESSEL MANULANI V-257  CONTR # 13428

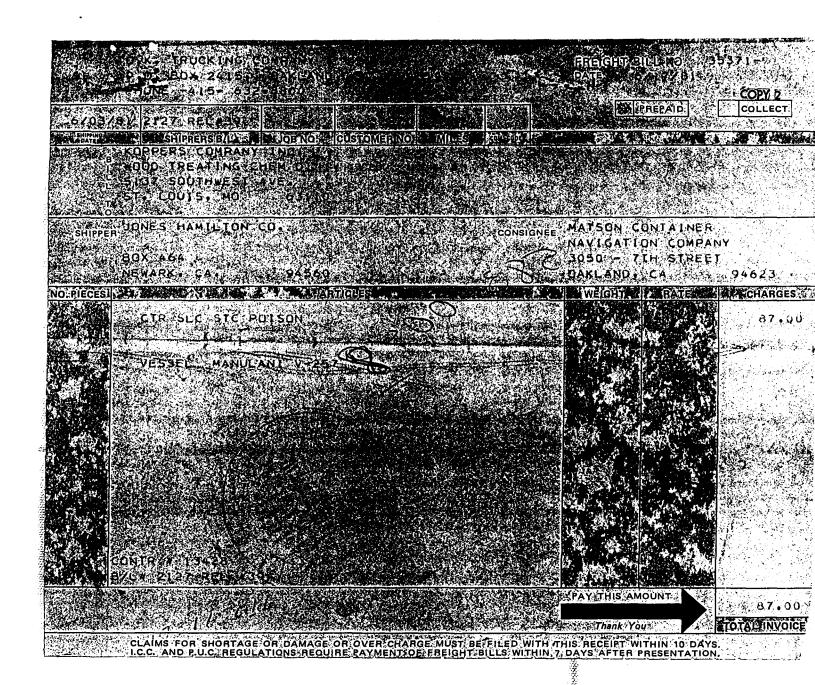
**KOPPERS** Transmittal Number\_\_\_ Plant Accounts Payable Invoice Sticker Purchase Order No. Requisition Number\_\_\_\_ Date Mat'l. Received\_ Date Inv. 6 Rec'd\_\_\_\_ Commitment Change Approval Date Inv. F'W'D. Receiving Report No Terms. Increase \$ Prepaid F.Q.B. [ ] Collect Prices Verified By Calculations Verified By Commitment Change Approved By 0048 55 Vendor Number Invoice Invoice Terms Code Due 3 50 **Account Distribution** Location Dept Purchase Order No. or Rec 13r PO PO Add P.O. Add General Ledger Sub Detait Tax\* ` **∗** Unit Detail Emp. No. Rec 13r Amount Distributed Quantity -or-Codes Ong. Loc. Contract Resource 5010 583 48 00 Invoice Amt (Gross) **Audit Number** л.н. то Рау Division Send. Loc. Month Serial No. For Treasury & Accounting Section Use Only Cash Discount Check Audited By Net Amount Payable 7 730 461 87 00 DS-37W REV. 9 100M: 7-80 \*See Reverse Side For Instructions



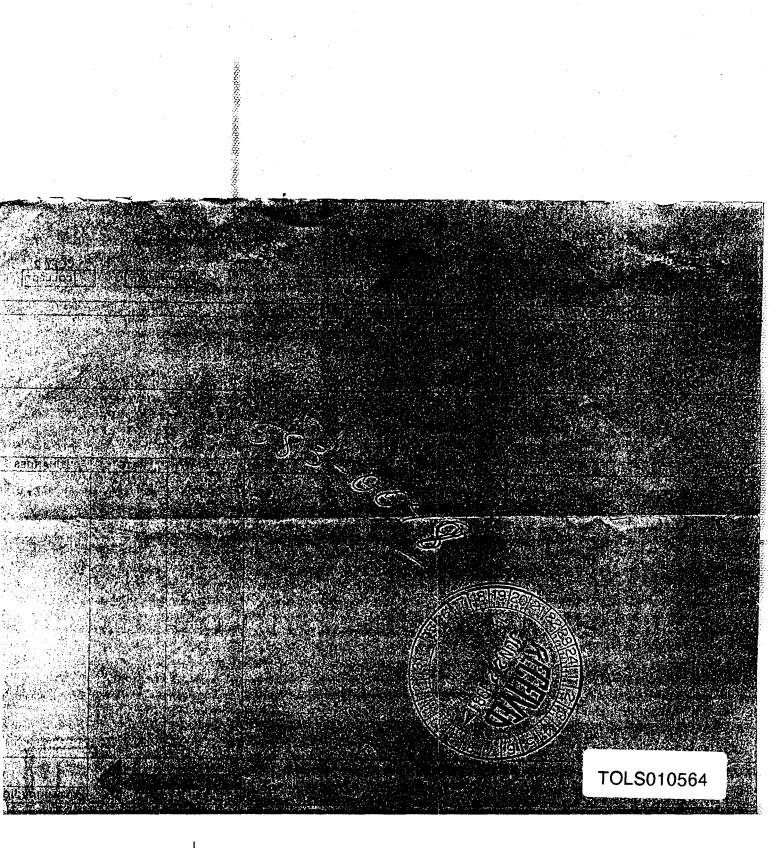
CLAIMS FOR SHORTAGE OR DAMAGE OR OVER CHARGE MUST BE FILED WITH THIS RECEIPT WITHIN 10 DAYS. I.C.C. AND P.U.C. REGULATIONS REQUIRE PAYMENT OF FREIGHT BILLS WITHIN 7 DAYS AFTER PRESENTATION.



TOLS010562



TOLS010563





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### am test inc.

4900 9TH AVENUE N.W., • SEATTLE, WASHINGTON 98107-3697 • 206/783-4700

#### ANALYSIS REPORT

CLIENT: Time Oil Company DATE REPORTED: 4/18/83

REPORT TO: Neil Wallis P.O.# 24870

P.O. Box 03117 St. Johns Station

Portland, OR 97203

Laboratory Sample No.

57057

Client

Identification

. Soil 2/28/83

SUBJECT: Static acute fish bioassay testing on juvenile rainbow trout Salmo

gairdneri.

PROCEDURE: Sample was tested at both the 100 and 1000ppm levels. The procedure

followed is outlined in the State of Washington's General Procedure

for Static Acute Fish Bioassay Testing.

The test was begun using method two in which the test organisms were placed into the chambers within 30 minutes of adding the toxicant to the water. Daily logs of temperature, dissolved oxygen and mortalities

were maintained.

The second of th Thirty (30/30) of the fish tested at the 1000 ppm level died within the first five hours of the four day test period.

Thirty (30/30) of the fish tested at the 100ppm level died within 24 hours of the four day period.

None (0/60) of the control fish died during the four day test period.

CONCLUSION: The soil sample submitted by the Time Oil Company was found to be toxic

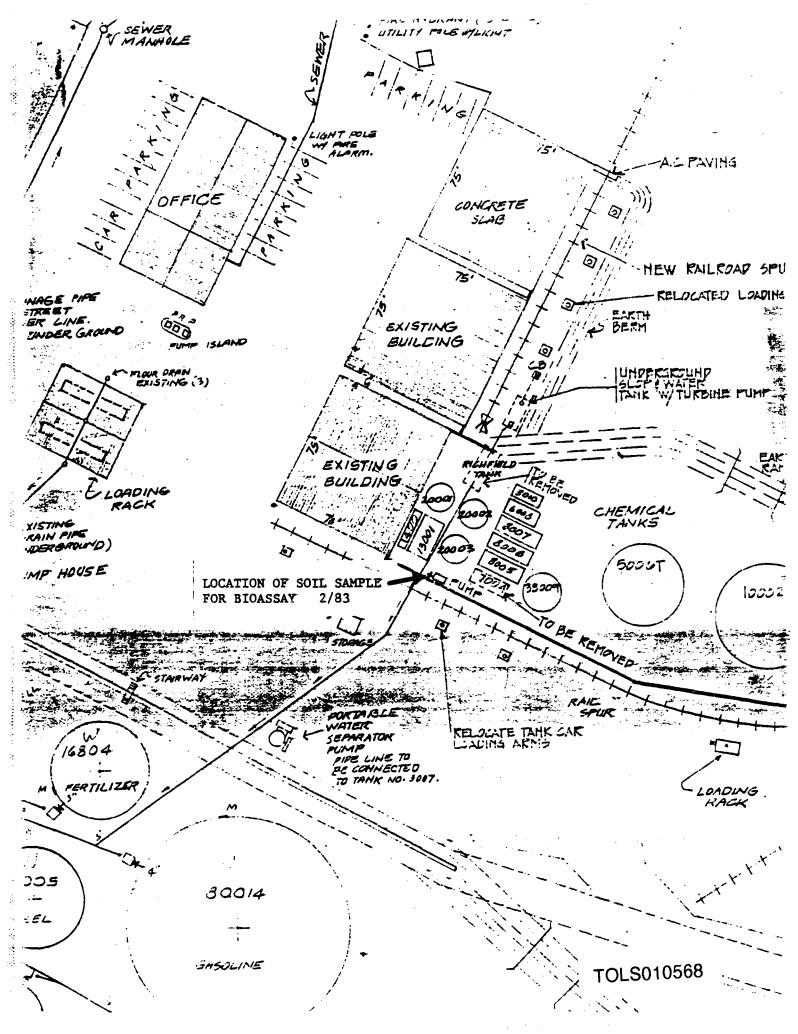
to juvenile rainbow trout at both the 100 and 1000 ppm hazardous waste

material (E.H.W.) under Washington State Guidelines.

Respectfully Submitted,

Mark A. Fugiel

Director of Industrial Chemistry



DATE: W4 MAY 84 02K

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LAB #: 84-0326 ITEM #: 1 SAMPLE: #1 LEGAL

PCB'S METHOD 608

AMOUNT PARAMETER
MG/KG

1206 PCB GROUP 1 127 PCB GROUP 2 24 PCB GROUP 3 1357 TOTAL PCB

PCB GROUP 1 INCLUDES PCB'S 1221, 1232, 1242 AND IS CALCULATED AS 1242. PCB GROUP 2 INCLUDES PCB'S 1248, 1254, AND IS CALCULATED AS 1254. PCB GROUP 3 INCLUDES PCB'S 1260, 1262 AND IS CALCULATED AS 1260.

DATE: 24 MAY 94

MH

ITEM 4: 1 SAMPLE: \$1

### ACID EXTRACTABLES METHOD 625

AMOUNT	PARAMÉTER	AHOUNT	PARAMETER
M6/K6	•	MS/KS	
*******	********************************	*******	*******************************
	•		
<18	PHENOL	(15	2,4,6-TRICHLOROPHENOL
<15	2-CHLOROPHENOL	(16	2,4-DINITROPHENOL
<15	2-NITROPHENOL	<1€	4-NITROPHENOL
<1₽	2,4-DIMETHYLPHENOL	<10	2-HETHYL-4, 6-DINITROPHENOL
<15	2, 4-DICHLOROPHENOL	179	PENTACHLOROPHENOL
<15	4-CHLORO-3-METHYLPHENOL	<1.5	TETRACHLOROPHENOL **
			. ** REPORTED AS

2,3,4,6-TETRACHLOROPHENOL

#### BASE/NEUTRAL EXTACTABLES METHOD 625

12221111		******	***********************
anount NG/KG	PARAMETER	amburit Me/ke	PARAMETER.
*******		22823333	
<15	BIS(2-CHLOROETHYL) ETHER	919	ACENAPHTHENE
<18	1,3-DICHLOROBENZENE	<1#	2,4-DINITROTOLUENE
<15	1,4-DICHLOROBENZENE	2386	FLUORENE
<1€	1,2-DICHLOROBENZENE	<1₫	DIETHYLPHTHALATE
₹1#	HEXACHLOROETHANE	<1₫	N-MITROSODIPHENYLAMINE
<10	N-NITROSO-DI-N-PROPYLAMINE	<1₽	4-BROMOPHENYL PHENYL ETHER
(10	NITROBENZENE	<b>(18</b>	HEXACHLOROBENZENE
<19	ISOPHORONE	4686	PHENANTHRENE
<15	BIS(2-CHLOROETHOXY) METHANE	9186	ANTHRACENE
(18	1,2,4-TRICHLGROEENZENE	<15	DIBUTYL PHTHALATE
1366	NAPHTHALENE	919	FLUORANTHENE
<16	HEXACHLOROBUTADIENE	55#	PYRENE
<15	HEXACHLOROCYCLOPENTADIENE	(15	BUTYL BENZYL PHTHALATE
<15	2-CHLGRONAPHTHALENE	165	BENZ (A) ANTHRACENE
<18	ACENAPHTHYLENE	639	CHRYSENE
<1€	DINETHYLPHTHALATE	<15	3,3'-DICHLROBENTIDINE
<19	2,6-DINITROTOLUENE	<16	BIS(2-ETHYLHEXYL) PHTHALATE
	•	. 96	BENZ (A) PYRENE

DATE: 24 MAY 84

Dyl-

.CAB #: 64-#326 ITEN #: 1-SAMPLE: #1

### LEGAL

PESTICIDES METHOD 625

**AMOUNT** 

PARAMETER

MG/KE

- (50 ALPHA-BHC
- 450 HEPTACHLOR
- 456 ALDRIN
- KSS HEPTACHLOR EPOXIDE
- (56 ENDOSULFAN I
- **158** TRANS-NONACHLOR
- (50 P,P'-DDE
- (56 DIELDRIN
- (50 ENDRIN
- (5# ENDOSULFAN II
- <5# P,P'-000
- (58 ENDOSULFAN CYCLIC SULFATE
- **456** P,P\*-DDT
- (56 GAMMA-BHC (LINDAME)

GC/MS SCAN ID

23 MAY 84

MAG

84-Ø326 #1

IN ADDITION TO THE PRIDITY POLLUTANT CHEMICALS, THE FOLLOWING COMPOUNDS WERE OBSERVED AT THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	. MG/KG
UNDECANE	29ø
DODECANE	530
TRIDECANE	2400
2-METHYL NAPHTHALENE	650
1,1'-BIPHENYL	400
TETRADECANE	1100
1,8-DIMETHYL NAPHTHALENE	58ø
2,6,10,14-TETRAMETHYL HEPTADECANE	320
PENTADECANE	7 <b>5</b> Ø
2-(1-METHYLETHYL) NAPHTHALENE	160
DIBENZOFURAN	1600
HEPTADECANE	620
DIBENZOTHIOPHENE	400
OCTADECANE -	5800
CARBAZOLE	3100
NONADECANE	370
3-METHYL PHENANTHRENE	1.50
EICOSANE	260

DATE: Ø4 MAY 84

LEGAL

LAB #: 84-0325 LEK

ITEM #: 2 SAMPLE: #2

> PCB'S METHOD 608

AMOUNT PARAMETER

MG/KG

47.4 PCB GROUP 1 ,9.7 PCB GROUP 2 2.6 PCB GROUP 3 59.7 TOTAL PCB

PCB GROUP 1 INCLUDES PCB'S 1221, 1232, 1242 AND IS CALCULATED AS 1242. PCB GROUP 2 INCLUDES PCB'S 1248, 1254' AND IS CALCULATED AS 1254. PCB GROUP 3 INCLUDES PCB'S 1260, 1262 AND IS CALCULATED AS 1260.

DATE: 24 MAY -9

HYG

LAB #: 84-#326

ITEM #: 2 SAMPLE: #2 LEGAL

ACID EXTRACTABLES
METHOD 625

******	*************************	*********	1222222	**********************		
AMOUNT	PARAMETER		AHOUNT	PARAMETER		
M6/KG			MG/KG			
*******	######################################	:::::::::	************************			
<1€	PHENOL		(19	2,4,6-TRICHLOROPHENOL		
<15	2-CHLOROPHENOL	<i>t</i>	(18	2,4-DINITROPHENOL		
(15	2-NITROPHENGL		(15	4-NITROPHENOL		
(15	2,4-DIMETHYLPHENOL		(19	2-NETHYL-4,6-DINITROPHENOL		
<1#	2,4-DICHLOROPHENOL		<16	PENTACHLOROPHENOL		
<15	4-CHLORO-3-METHYLPHENOL		<b>(19</b>	TETRACHLOROPHENOL ##		
				** REPORTED AS		

### BASE/NEUTRAL EXTACTABLES METHOD &25

******	*******************************	22 <b>22</b> 222	***************************************
ANGUNT	PARAMETER	AMOUNT	PARAMETER
H6/KE		M6/K6	
2242222	::::::::::::::::::::::::::::::::::::::	31811388	
<1≸	BIS (2-CHLOROETHYL) ETHER	56	ACENAPHTHENE
<15	1,3-DICHLOROBENZENE	`⟨1#	2,4-DINITROTOLUENE
<1≸	1,4-DICHLOROBENZENE	89	FLUORENE
<1€	1,2-DICHLOROBENZENE	<1#	DIETHYLPHTHALATE
<15	HEXACHLOROETHANE	(15	N-NITROSGDIPHENYLAMINE
<16	N-KITROSC-DI-N-PROPYLAMINE	<1€	4-BROMOPHENYL PHENYL ETHER
<16	NITROBENZENE	(19	HEXACHLOROBENZENE
₹10	ISOPHORONE	260	PHENANTHRENE
<19	BIS(2-CHLOROETHOXY) METHANE	256	ANTHRACENE
₹1#	1,2,4-TRICHLOROBENZENE	(19	DIBUTYL PHTHALATE
186	NAPHTHALENE	86	FLUORANTHENE
<1₫	HEXACHLOROBUTADIENE	5 <b>#</b>	PYRENE
(15	HEXACHLOROCYCLOPENTADIENE	(18	BUTYL BENZYL PHTHALATE
(18	2-CHLORONAPHTHALENE	<19	BENZ (A) ANTHRACENE
(15	ACENAPHTHYLENE	<18	CHRYSENE
<18	DINETHYLPHTHALATE	<15	3,3'-DICHLROBENZIDINE
(19	2,6-DINITROTOLUENE	<15	BIS(2-ETHYLHEXYL) PHTHALATE
		<16	BENZ (A) PYRENE

. DATE: 24 HAY 84

LAB 8: 84-8326

ITEM 8: 2 SAMPLE: \$2

> PESTICIDES METHOD 625

ANDUNT PARAMETER NG/KG .

(56 ALPHA-BHC

458 HEPTACHLOR

**(58 ALDRIN** 

**K5# HEPTACHLOR EPOXIDE** 

456 ENDOSULFAN I

CSS TRANS-NONACHLOR

(58 P,P'-DDE

(56 DIELDRIN

(50 ENDRIN

<56 ENDOSULFAN II

(56 P,P'-000

KSS ENDOSULFAN CYCLIC SULFATE

(58 P,P'-DDT

(58 GAMMA-BHC (LINDANE)

GC/MS SCAN ID

23 MAY 84

Dy

84-0326 #2

IN ADDITION TO THE PRICITY POLLUTANT CHEMICALS, THE FOLLOWING COMPOUNDS WERE OBSERVED AT THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	1 ×	MG/KG
TETRADECANE		4Ø
HEPTADECANE		100
2,6,10,14-TETRAMETHYL	PENTADECANE	30

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TANK NO.	JAN	FEB	MAR	APR	YAM	JUN	JUL	AUG '	SEP	ост	NOV	DEC
-164- 7004	TH	MT	HT	HT	HT	HT	HT	HĪ	HT	MT		
- <del>301</del> - /300/	PE	PB	PE	PE	PE	PE	PE	PE	PE	TM		
471- 30997	PE	PE	PE	PE	PE	PE	PE	PR	F:B	HT		
4 <del>72-</del> 2000 Z	s	S	S	S	S	S	s	S	s	HT		
₹ <del>73</del> ₹000 <b>3</b>	MT	HT	HT	HT	MT	ht	MT	HT	MT	HT		
<del>-910-</del> 38009	HT	HT	MT	HT	HT	HT	HT	HT	ht	HT		
2524	I	I	I	I	I	I	I	I	I	I		
2525	MB	HE	HE	MB	ME	ME	ME	HE	K.E	HE		
4408	HT	HT	HT	HT	HT	HT	HT	MT	ET	HT		
5006	HT	HT	HŢ	HT	HT	TK	HT	MT	MI	MT		
5006T	со	со	со	со	co	co	со	ço	CO	со		
5312	#2	LF	LP	LP	LF	LF	LP	MT	<b>P</b> (T	MT		
5313	HT	HT	TM	TK	HT	HT	HT	MT	4:2	MT		
9509	HÌ	HT	HT	HT	ht	HT	ht	HT	Ti4	MT		
9510	MT	HT	RI	MT	MT	HT	HT	HT	AIT	HT		

#### KEY

CO - Crosby & Overton	M - Methanol	S - Solvent
I - Isobutanol	MB - Methyl 10	T - Turpentine
J - Jet Fuel	MT - Empty	U - Unleaded Gasoline
FA - Fatty Acid (by-prod. of wood)	NI - Not Installed	#1 - Fuel Oil #1
LO - Lube Oil	PE - Pentachlorophenol	#2 - Fuel Oil #2
LF - Liquid Fertilizer	P - Premium Gasoline	#4 - Fuel Oil #4
LL - Lignin Liquor	R - Regular Gasoline	

TANK NO.	JAN	FEB	MAR	APR	YAH	JUN	JUL	AUG	SEP	OCT	NOV	DEC
38015	HT	HT	нт	MT	HT	HT	HT	MT	HT	нт		
38016	нт	HT	нт	MT	HT -	HT	HT	MT	HT	нт		
38017	ht	HT	HT	HT	HT	HT	MT	HT	MT	HT		
55021	HT	TH	HT	HT	TK	нт	HT	нт	HT	НT		
80009	HT	HT	HT	HT	HT	нг	HT	HT	HT	MT		
80010	HT	HT	KT	HT	HT.	HT	MT	HT	HT	HT		
80014	HT	HT	HT	нт	HT	HT	HT	HT	HT	HT		
80408	н	н	H	М	М	H	M	H	н	н		
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		•		,								
					•							·
	. •											

#### KEY

CO	_	Crosby & Overton	
I	-	Isobutanol	
J	-	Jet Fuel	
E A		Setty Anid /hy-need	AP WOAAL

FA - Fatty Acid (by-prod. or wood)

LO - Lube Oil

LF - Liquid Fertilizer LL - Lignin Liquor

H - Methanol

HE - Hethyl 10 MT - Empty

NI - Not Installed

- Pentachlorophenol - Premium Gasoline - Regular Gasoline

- Solvent

- Turpentine

- Unleaded Gasoline

#1 - Fuel Oil #1

- Fuel Oil #2

#4 - Fuel Oil #4

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TANK NO.	JAN	FEB	MAR	APR	YAH	JUN	JUL	AUG	SKP	OCT	NOV	DEC
10002	со	со	со	со	со	со	CO	со	CO	со		
11005	#2	#2	#2	#2	#2	#2	#2	#2	#2	#2		
12001	HT	HT	MT	HT	MT	MT	MT	HT	HIL	HT		
12002	HT	HT	HT	TM	HT	HT	TM	HT	M:C	MT		
12003	нт	HT .	нт	нт	MT	nt	HT	MT	n.t	нт		
12004	нт	нт	тн	HT	HT	HT	MT	HT	HI3	HT		
12005	HT	HT	TM	HT.	TM	HT	MT	HT	H:C	HT		
14501	#2	LF	LF	LF	LF	LF	HT	TH	HI	MT		
15001	MT	MT	HT	HT	HT	HT	HT	HT	MT	HT		
15002	MT	HT	MT	HT	HT	MT	HT	HT	W:C	HT		
15005	#2	LF	LF	LF	LF	LF	HT	нт	HT	HT		
16003	HT	HT	HT	TH	MT	TH	MT	нт	N.C	MT		
16804	MT	мт	нт	TH	MT	нт	HT	MT	нг	MT		
20511	#2	#2	#2	#2	#2	#2	#2	#2	#2	#2		
29508	NT	MT	TK	MT	MT	HT	HT	MT	118	нт		

#### KEY

CO	-	Crosby & Overton	
T		Techutanol	

J - Jet Fuel

FA - Fatty Acid (by-prod. of wood)

LO - Lube Oil

LF - Liquid Fertilizer

LL - Lignin Liquor

H - Methanol

MR - Methyl 10

HT - Empty

NI - Not Installed

PE - Pentachlorophenol
P - Premium Gasoline
R - Regular Gasoline

S - Solvent

T - Turpentine

U - Unleaded Gasoline

#1 - Fuel Oil #1 #2 - Fuel Oil #2

#4 - Fuel Oil #4

#### DEPARTMENT OF ENVIRONMENTAL QUALITY Request for Analysis

		site: Time Oil	_		Analysis		Laboratory No. 84-1020  Date Received Lab: DEC 13 MM 1245			
		By: RFG, JLS		•			Date Reported: JAN 15 1985			
Con	wents:	The state of the s			•	•	Report Data To:  lab prepar lab don't ringe: Organic(Y) magon jar			
•	em No.	Sampling Point Description  (include time)	*Sample Contrients	ontainer		#'s	labdon't rinse; Organic(X) mason jar  Test Required			
1	انك	((	:			51011	EP tox Pb II GCIHS acidIBN PCB'S			
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10	) A'					21017	c i			
····\\	5	u				Z1016	u			
12	-	((				21004	V			

DEPARTMENT OF ENVIRONMENTAL QUALITY
Laboratory Data Sheet

With Stable Alexander

Laboratory No: 84-1020

Program Code: 4290

Page: 1 of: 49

Time	0:1					`	RFG		Analys	sis Compl	eted: J/III	0.4 1975
Item No.					Test Res	ults (Al	l units i	ng/1 or	ug/m³)			
	bag#	EP Tox Pb										
1	Z 1020	20.1										
ュ	Z 1007	<0.1										
3	21019	<0.1		<u> </u>								
Н.	₹1008	<0.1	<u> </u>	ļ								
_ 5	7 1009	20,1			-				 			
6	21010	<0.1					•	•	•	•	•	
7	21011	<0.1		\ 								ar a
8	Z 1012	<0.1			ļ			:			. ~	F Ø
9	₹1018	<0.1									495	1984 1984
10	21017	<0.1								0	gal	\$ 6.4 g
11	21016	20.1								529. Sem	_	
12	21004	<0.1								2923 un &	13	1983
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TOLS010581

Comments:

BZTO104(e)047414

BATE: 31 DEC 84

ME

LAB 4: 48-1928 ITEN 9: 1 SAMPLE: Z1828

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3548

ANOUNT PARAMETER
MG/KG

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-NONACHLOR
- (5 P,P'-0DE
- (5 DIELDRIN
- (5 ENDRIN
- (5 ENDOSULFAN II
- (5 P,P'-000
- KS ENBOSULFAN CYCLIC SULFATE
- <5 P,P'-00T
- (5 SAMMA-BHC (LINDAME)

449

LAB 8: 84-1828 ITEN 8: 2 SAMPLE: 21887

PESTICIDES
METHOD 425
EXTRACTED BY RCRA 3546

ANGUNT PARAMETER NS/KG

- (3 ALPHA-BHC
- (5 HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-NONACHLOR
- (5 P.P'-DDE
- (5 DIELDRIN
- (5 ENDRIN
- (5 ENDOSULFAN II
- (5 P,P'-000
- (5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 GANNA-BHC (LINDAME)

DATE: 28 DEC 84

ML

LAB 4: 84-1933 ITEM 4: 3 SAMPLE: 21619

PESTICIDES
METHOD 625
EITRACTED BY RCRA 3546

ANGUNT

PARAMETER

MG/KE

(5 ALPHA-BHC

- 13 NEFTH ONE
- (5 HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-NONACHLOR
- (5 P,P'-0DE
- (5 DIELDRIN
- (5 ENDRIN
- (5 ENDOSULFAN II
- (5 P.P'-000
- (5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 SAMMA-BHC (LINDANE)

,2/49

DATE: 31 DEC 84

MA

LAB #: 84-1928 ITEN #: 4 SAMPLE: 21888

PESTICIDES
HETHOD 625
EITRACTED BY RCRA 3548

ANOUNT

PARAMETER

HE/KE

/P AL DELA BLAS

- (5 ALPHA-9HC
- 45 HEPTACHLOR
- (5 ALDRIN
- (S HEPTACHLOR EPOXIDE
- KS ENDOSULFAN I
- CS TRANS-NONACHLOR
- (5 P,P'-00E
- (5 DIELDRIN
- (5 ENDRIN
- 45 ENDOSULFAN II
- (5 P,P'-000
- (5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-DDT
- (5 GAMMA-BHC (LINDAME)

DATE: 28 DEC 84

LAS 4: 84-1533 ITEN 4:5 SAMPLE: 11869

> PESTICIDES METHOD 625 EITRACTED BY RCRA 3548

ANOUNT PARAMETER MG/KG ALPHA-BHC ⟨5

- (5 HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- TRANS-NONACHLOR
- P.P'-00E
- (5 DIELDRIN
- (5 EXDRIN
- (S ENDOSULFAN II
- (5 P,P'-000
- KS ENDOSULFAN CYCLIC SULFATE
- P.P'-00T (5
- SANNA-BHC (LINDANE)

DATE: 28 DEC 84

LAB 4: 84-1933 ITEN 4: 6 SAMPLE: Z1818

PESTICIDES
METHOD 625
EITRACTED BY RCRA 3546

AHOUNT PARAMETER
NS/KG

<S ALPHA-BHC

- (5 HEPTACHLOR
- (5 ALDRIN
- (\$ HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-HONACHLOR
- (5 P,P'-0DE
- (5 DIELDRIN
- (S ENDRIN
- (5 ENDOSULFAN II
- (5 P,P'-000
- (5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 SANNA-BHC (LINDAME)

DATE: \$3 JAN 85

MILE

LAB 0: 84-1028 ITEM 0: 7 SAMPLE: 71811

PESTICIDES
NETHOD 625
EXTRACTED BY RCRA 3346

ANOUNT

PARAMETER

MB/KB

- (5 ALPHA-SHC
- (5 HEPTACHLOR
- (5 ALDRIN
- <5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- <5 TRANS-HONACHLOR</p>
- (5 P,P'-0DE
- (5 CIELDRIN
  - 5 ENDRIN
- S ENDOSULFAN II
- (5 P,P'-000
- (5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 GAMMA-BHC (LINDAME)

DATE: #3 JAN 85

**D**1/1

LAB 4: 84-1626 ITEM 4: 8 SAMPLE: Z1612

PESTICIDES METHOD 623
EXTRACTED BY RCRA 3540

ANOUNT PARAMETER MS/KS

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- (5 ALDRIN
- (S HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (S TRANS-NONACHLOR
- (5 P,P'-00E
- (5 DIELDRIN
- (5 ENDRIN
- (S ENDOSULFAN II
- (5 P,P'-00D
- C ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 GAMMA-BHC (LINDAME)

DATE: #3 JAN 85

MG

LAB 4: 84-1026 ITEM 4: 9 SAMPLE: ZIS18

PESTICIDES
NETHOD 625
EITRACTED BY RCRA 3546

ANOUNT PARAMETER
MG/KG

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- (5 ALDRIN
- S HEPTACHLOR EPOXIDE
- (S ENDOSULFAN I
- CS TRANS-NONACHLOR
- (5 P,P'-00E
- <5 DIELDRIN
- 45 ENDRIN
- S ENDOSULFAN II
- (5 P,P'-000
- KS ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-DOT
- (5 GAMMA-BHC (LINDANE)

DATE: #3 JAN 85

LAB 4: 84-1625 15

ITEM #: SAMPLE: ZISI7

> PESTICIDES METHOD 625 EITRACTED BY RCRA 3548

ANGUNT PARAMETER HG/KS

- ⟨5 ALPHA-SHC
- ⟨5 HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPGXIDE
- (5 ENDOSULFAN I
- (5 TRANS-NONACHLOR
- (5 P,P'-00E
- (5 DIELDRIN
- (5 ENDRIN
- (5 ENDOSULFAN II
- ⟨5 P<del>,P</del>'-000
  - (5 ENDOSULFAN CYCLIC SULFATE
  - P.P'-99T
  - GAMMA-BHC (LINDAME)

DATE: \$2 JAN 85

ME

LEGAL

ITEM 4: 11 SAMPLE: Z1816

PESTICIDES
METHOD 525
EXTRACTED BY RCRA 3548

**AHOUNT** PARAMETER **(5** ALPHA-9HC HEPTACHLOR ⟨5 ALDRIN ⟨5 HEPTACHLOR EPOXIDE (5 (5 ENDOSULFAN I (5 TRANS-NONACHLOR (5 P, P'-00E (5 DIELDRIN (5 ENDRIN (5 ENDOSULFAN II P,P'-000 ⟨5 ENDOSULFAN CYCLIC SULFATE ⟨5

P,P'-00T

GAMMA-BHC (LINDAME)

⟨5

DATE: 02 JAN 85

Diff

LAB 4: 84-1026

ITEN 4: 12 SAMPLE: I1864

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3546

AROUNT PARAMETER

ME/KE

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-HONACHLOR
- (5 P,P'-00E
- (5 DIELDRIN
- / (5 ENDRIN
  - (5 ENDOSULFAN II
  - <5 P,P'-000
  - K5 ENDOSULFAN CYCLIC SULFATE
  - (5 P,P'-00T
  - (5 GAMMA-BHC (LINDANE)

Dyll

31 DEC 84

GC/MS SCAN ID

84-1020 71020

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS. THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

02 JAN 85

GC/MS SCAN ID

84-1020 71007

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

· TOLS010595

HE

28 DEC 84

GC/MS SCAN ID

84-1020 21019

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

· TOLS010596

13/4°

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GC/MS SCAN ID

31 DEC 84

84-1020 71008

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
NONANE	1
DECANE	· 4
4-METHYLDECANE	. 3
UNDECANE	19
2-METHYLUNDECANE	8
DODECANE	46
TRIDECAÑE	67
7-METHYLTRIDECANE '	38
HENEICOSANE	37

16/40

LEGAL

Egyl

28 DEC 84

GC/MS SCAN ID

84-1020 71009

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIDRITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

19/49

DI

29 DEC 84

GC/MS SCAN ID

84-1020 Z1010

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

भ्रा

Ø3 JAN 85

GC/MS SCAN ID

84-1020 71011

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

25/49

Doll

Ø3 JAN 85

GC/MS SCAN ID

84-1020 Z1012

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

28/49

HE

Ø3 JAN 85

GC/MS SCAN ID

84-1Ø2Ø Z1Ø18

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
DODECANE	6
TRIDECANE	8
PENTADECANE	6

ME

Ø3 JAN 85

#### GC/MS SCAN ID

84-1020 21017

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE. 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
1-ETHYL-4-METHYLCYCLOHEXANE	10
2,6-DIMETHYLOCTANE	10
4-METHYLNONANE	8
1-METHYL-4-(1-METHYLETHYL)CYCLOHEXANE	12
4-METHYLDECANE	36
BUTÝLCYCLOHEXANE	14
5-METHYLDECANE	15
3-METHYLDECANE	8
UNDECANE	18
OCTYLCYCLOPROPANE	53

THE SAMPLE ALSO CONTAINED NUMEROUS OTHER COMPOUNDS NOT IDENTIFIED. THE PATTERN, HOWEVER, WAS INDICATIVE OF A SOLVENT MIXTURE SIMILAR TO PAINT THINNER.

Dyl

Ø2 JAN 85

GC/MS SCAN ID

84-1020 21016

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

871

Ø2 JAN 85

GC/MS SCAN ID

84-1020 71004

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS. THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 31 DEC 84

## LEGAL

249

LAB 4: 84-1929

ITEN 4: 1 SAMPLE: Z1828

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3546

AHOUNT NS/KS	PARAMETER	ANCUNT HG/KG	PARAMETER
2222222		*******	
(1	PHENOL	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
(1	2-NITROPHENOL	. (1	4-NITROPHENOL
<1	2,4-DINETHYLPHENOL	(1	2-METHYL-4, &-DIMITROPHENOL
. (1	2, 4-BICHLGROPHENOL	⟨1	PENTACHLOROPHENOL
(1	4-CHLORO-3-METHYLPHENOL	(I	TETRACHLOROPHENOL **
			** REPORTED AS
,	_		2,3,4;6-TETRACHLOROPHENOL

### BASE/NEUTRAL EXTRACTABLES NETHOD 625

-	************************************	*******	
AMOUNT	PARAMETER	AMOUNT	PARAMETER
M6/K6		MG/KG	
:::::::::::::::::::::::::::::::::::::::		********	
<1	BIS(2-CHLOROSTHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	(1	2,4-DINITROTOLUENE
(1	1,4-DICHLOROSENZENE	(i	FLUORENE
(1	1,2-DICHLORCSENZENE	<1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
(1	N-NITROSO-DI-N-PROPYLAMINE	⟨1	4-BRONOPHENYL PHENYL ETHER
⟨1	NITROBENZENE	(1	HEXACHLOROBENZENE
(1	ISOPHORONE	<1	PHENANTHRENE
(1	BIS(2-CHLOROETHOIY) METHANE	(1	ANTHRACENE
(1	1,2,4-TRICHLGROBENZENE	(1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	(1	FLUORANTHENE
⟨1	HEXACHLOROBUTADIENE	<b>(1</b>	PYRENE
(1	HEXACHLOROCYCLOPENTAD I ENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	<1	CHRYSENE
(1	DIMETHYLPHTHALATE	€1	3,3'-DICHLAGBENZIDINE
(1	2.6-DINITROTCLUENE	· <b>(1</b>	•
•••		(1	BENZ (A) PYRENE

SAMPLE: 21887

84-1929

AH

LEGAL

5/49

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3548

25325252	######################################	2222222	***********************
AHOUNT	PARAMETER	AHOUNT	PARAMETER
MG/KS		MG/KG	
18112222		*******	
⟨1	PHENOL	(1	2, 4, 6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
(1	2-NITROPHENOL	(1	4-NITROPHENOL
<1	2.4-DIMETHYLPHENOL	(1	2-METHYL-4, 4-9 IN ITROPHEMOL
(1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
(1	4-CHLORO-3-HETHYLPHENOL	<1	TETRACHLOROPHENOL ++
		•	** REPORTED AS
	•		2,3,4,6-TETRACHLOROPHENOL

#### BASE/NEUTRAL EXTRACTABLES NETHOD 625

2222222	***************************************	*******	***************************************
ANDUNT	PARAMETER	AMOUNT	PARAMETER
H6/K6		MG/KS	
:::::::::::::::::::::::::::::::::::::::		********	13231232311112172211821121821527211
(1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
	1,4-DICHLOROBENZENE	(1	FLUORENE
	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
(1	N-MI (KUSU-OI-M-PHUPYLAHINE	(1	4-BROMOPHENYL PHENYL ETHER
(1	NITROSENZENE .	<b>(1</b>	HEXACHLOROBENZENE
(1	ISOPHORONE	(1	PHENANTHRENE
(1	BIS(2-CHLOROETHOXY) METHANE	(1	ANTHRACENE
(1	1, 2, 4-TRICHLGROBENZENE	(1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	. (1	FLUORANTHENE
(I	HEXACHLOROBUTADIENE	(1	PYRENE
(I	HEIACHLOROCYCLOPENTAD IENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	(1	CHRYSENE
(1)	DIMETHYLPHTHALATE	. (1	3,3'-DICHLROBENZIDINE
⟨1	2.6-DINITROTOLUENE	(1	•
,,	2,0 0	(1	BENZ (A) PYRENE

DATE: 28 DEC 84

LAB #: 84-1833 ITEN #: 3 SAMPLE: Z1819

ACID EXTRACTABLES
METHOD 425
EXTRACTED BY RCRA METHOD 3548

*******	*************************		***************************************
ANOUNT MG/KG	PARAMETER	AMOUNT ME/KG	PARAMETER
12027220		* 20001222	***************************************
(1	PHENOL .	(1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	⟨1	2,4-DINITROPHENOL
(1	Z-NITROPHENOL	(1	4-NITROPHENOL
<1	2,4-DINETHYLPHENOL	(1	2-METHYL-4.6-DINITROPHENOL
<1	2,4-DICHLORGPHENOL	(1	PENTACHLOROPHENOL
. (1	4-CHLORO-3-METHYLPHENOL	(1	TETRACHLOROPHENOL ++
			** REPORTED AS
			2 7 4 L_TETRACUL ROROUEWA

### BASE/NEUTRAL EXTRACTABLES NETHOD 625

2222233	***************************************	*******	*******************************
AMOUNT	PARAMETER	AMOUNT	PARAMETER
MG/KG		M6/K6	
*******	***************************************	22802283	**********************
<1	BIS(2-CHLCROETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
⟨1	1,4-DICHLOROSENZENE	(1	•
(1	1,2-01CHLOROBENZENE	(1	DIETHYLPHTHALATE
<b>(1</b>	HEIACHLORGETHANE	(1	N-NITROSODIPHENYLAMINE
(1	N-MITROSO-DI-N-PROPYLAMINE	<1	4-BRONOPHENYL PHENYL ETHER
(1	NITROBENZENE	⟨1	HEXACHLOROBENZENE
(1	ISOPHORONE	(1	PHENANTHRENE
(1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	(1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	• (1	FLUORANTHENE
(1	HEIACHLOROSUTADIENE	(1	PYRENE
(1	HEXACHLORGCYCLOPENTADIENE	· (1 -	BUTYL BENZYL PHTHALATE
(1	2-CHLORGNAPHTHALENE	. (1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	1,41	CHRYSENE .
(1	DINETHYLPHTHALATE	1 (1	3,3"-OICHLROBENZIDINE
(1	2,4-DINITROTOLUENE	· (1	
	•	4	BENZ (A) PYRENE

#### 11/49

## LEGAL

DATE: 31 DEC 84

LAS 4: 84-1525 ITEN 8: 4 SAMPLE: Z1588

## ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3346

22020222	**************	*******	***************************************
THUOKA	PARAMETER	AMOUNT	PARAMETER
M8/K8		ng/ke	
12612221	***************************************	38224345	
a	PHENOL	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	(1	2,4-9INITROPHENOL
(1	2-NITROPHENOL	(1	4-NITROPHENOL
(1	2,4-01HETHYLPHENOL	(1	2-METHYL-4, 6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
(1	4-CHLORG-3-METHYLPHENGL	<1	TETRACHLOROPHENOL ++
	_		** REPORTED AS
,	•		2,3,4,6-TETRACHLOROPHENOL

#### BASE/NEUTRAL EXTRACTABLES METHOD 625

	***************************************	*******	*************
AMOUNT MS/KG	PARAMETER	AHOUNT HG/KS	PARAMETER
122223123		:222223	
<1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-01CHLOROBENZENE	3	2,4-DINITROTOLUENE
(1	1,4-01CHLOROBENZENE	1	FLUORENE
1)	1,2-01CHLORG3ENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	2	N-NITRGSODIPHENYLANINE
(1	N-MITROSC-OI-K-PROPYLAMINE	(1	4-BRONCPHENYL PHENYL ETHER
<b>(1</b>	NITROBENZENE	<1	HEXACHLOROBENZENE
1	ISOPHORONE	• 1	PHENANTHRENE
(1	815(2-CHLORGETHOXY) HETHANE	1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
(1	HEXACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE TOLS010609
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE.   OLSO 10000
⟨1	ACENAPHTHYLENE	(1	CHRYSEKE
(1	DINETHYLPHTHALATE	. (1	3,3'-DICHLROSENZIDINE
(1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
	•	<b>ć</b> 1	BENZ (A) PYRENE

DATE: 29 DEC 84

HLE

LAB 4: 84-1828 ITEN 8: 5 SAMPLE: 21869

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA HETHOD 3540

***************************************		*******************************		
AMOUNT M6/KG	PARAMETER	ANCUNT M6/K6	PARAMETER	
*******		********	***************************************	
(1	PHENOL	(1	2,4,6-TRICHLOROPHENGL	
(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL	
(1	2-NITROPHENOL	⟨1	4-NITROPHENOL	
<1	2,4-DIHETHYLPHENOL	(1	2-METHYL-4, 4-DINITROPHENOL	
(1	2,4-01CHLOROPHENOL	(1	PENTACHLOROPHENOL	
- (1	4-CHLORG-3-HETHYLPHENGL	(1	TETRACHLOROPHENOL ++	
			** REPORTED AS	
			2,3,4,6-TETRACHLOROPHENOL	

### BASE/NEUTRAL EXTRACTABLES NETHOB 625

***************************************		*******	3734738268257333333333333333333333333333333333333
ANOUNT	PARAMETER	ANGUNT	PARAMETER
M6/K6		MG/KG	
*********	***************************************	********	***************************************
<1	BIS(2-CHLORGETHYL) ETHER	(1.	ACENAPHTHENE
(1	1,3-01CHLOROBENZENE	(1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	(1	FLUORENE
(1	1,2-01CHLOROBENZENE	(1	DIETHYLPHTHALATE
<1	HEIACHLOROETHANE	(1	N-NITROSODIPHENYLANINE
<1	N-NITROSO-DI-N-PROPYLANINE	(1	4-BRONOPHENYL PHENYL ETHER
(1	NITROBENZENE	(1	HEXACHLOROBENZENE
(1	ISOPHORONE	<b>(1</b>	PHENANTHRENE
(1	BIS(2-CHLGROETHOXY) METHANE	(1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	(1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLORGBUTADIENE	(1	PYRENE
(1	HEIACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
a	ACENAPHTHYLENE	(1	CHRYSENE
(I	DIMETHYLPHTHALATE	(1	3,3'-DICHLROBENZIDINE
(1	2.6-DINITROTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
••	aya assassas	(1	BENZ (A) PYRENE

DATE: 28 DEC 84

MA

LAB 8: 84-1933 ITEM 4: 6 SAMPLE: IIBIB

### ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3546

************************************		*************************************	
AHOUNT	PARAMETER	AMOUNT	PARAMETER
M6/KS		Mg/Kg	
*******		********	***************************************
(1	PHENOL	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
(1	2-NITROPHENOL	(1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	(1	2-NETHYL-4,5-0INITROPHENOL
(1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
⟨1	4-CHLORO-3-HETHYLPHENOL	<1	TETRACHLOROPHENOL ++
,			** REPORTED AS
/	•••		2.3.4.A-TETRACHLOROPHENOL

### BASE/NEUTRAL EXTRACTABLES METHOD 625

:11111111111111111111111111111111111111		***************************************	
AHOUNT	PARAMETER	AHOUNT	PARAMETER
ME/KE		MG/KE	
********	***************************************	*******	***************************************
<b>(1</b>	BIS(2-CHLORGETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-VICALOROSENIENE	(i	2,4-ginitrotoluene
<b>(1</b>	1,4-DICHLOROBENZENE	<1	FLUORENE
(1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	(1	N-MITROSODIPHENYLAMINE
(1	N-NITROSO-DI-N-PROPYLANINE	<1	4-BRONOPHENYL PHENYL ETHER
(1	NITROBENZENE	(1	HEIACHLOROBENZENE
(1	ISOPHORONE	1)	PHENANTHRENE
(1	BIS(2-CHLORGETHOXY) METHANE	(1	ANTHRACENE
(1	1, 2, 4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	(1	FLUORANTHENE
(1	HE LACHLOROBUTAD LENE	a	PYRENE
(1)	HEXACHLOROCYCLGPENTADIENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	(I	CHRYSENE
(1	DINETHYLPHTHALATE	(1	3.3'-DICHLROSENZIDINE
ä	2,6-DINITROTOLUENE	. (1	BIS(2-ETHYLHEIYL) PHTHALATE
**	age commencement	61	BENZ (A) PYRENE.

20/49

DATE: 43 JAN 85

ME

LAB 1: 84-1928 ITEN 1: 7 SAMPLE: Z1611

## ACIB EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3346

***************************************			***************************************
ANCUNT MG/KS	PARAMETER	amount Mg/kg	PARAMETER
********		33888338	******************************
(1	PHENOL	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
<b>(1</b>	2-NITROPHENOL	(1	4-NITROPHENOL
(1	2.4-0IMETHYLPHENOL	(1	2-METHYL-4, 6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
⟨1	4-CHLORO-3-METHYLPHENOL	(1	TETRACHLOROPHENOL ++
			## REPORTED AS

### BASE/NEUTRAL EXTRACTABLES HETHOD 625

		******	******************************
AMOUNT	PARAMETER	AMOUNT	PARAMETER
MG/KG		MG/KG	
:222222	*********************************	18333128	***************************************
(1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	(1	2,4-DINITROTOLUENE
(1	1,4-01CHLOROBENZENE	<1	FLUORENE
(1	1,2-DICHLORGBENZENE	(1	DIETHYLPHTHALATE
(1	HÉXACHLORGETHANE	(1	N-NITROSODIPHENYLAMINE
(1	N-NITROSO-01-N-PROPYLAMINE	(1	4-BRONOPHENYL PHENYL ETHER
(1	NITROSENZENE	(1	HEXACHLOROBENZENE
(1	ISGPHORONE	. (1	PHENANTHRENE
(1	BIS(2-CHLGROETHOXY) METHANE	<1	ANTHRACENE
a	1,2,4-TRICHLORGBENZENE	(1	DIBUTYL PHTHALATE
(1	MAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
(1	HEXACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	(1	CHRYSENE
(1	DINETHYLPHTHALATE	(1	3,3'-DICHLROSENZIDINE
(1	2.6-DINITROTOLUENE	ä	BIS(2-ETHYLHEXYL) PHTHALATE
••		(1	BENZ (A) PYRENE

DATE: 63 JAN 85

MA

LEGAL

23/49

LAB #: 84-1929 ITEN #: 8 SANPLE: I1912

### ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3546

***************************************		3222222	*************************************
ANOUNT MG/KG	PARAMETER	AMOUNT MG/KS	PARAMETER
***************************************		***************************************	
(1	PHENOL	<1	2,4,6-TRICHLOROPHENGL
(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	(1	4-NITROPHENOL
(1	2,4-DINETHYLPHENOL	<1	2-METHYL-4, &-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
(1	4-CHLORO-3-HETHYLPHENOL	(1	TETRACHLOROPHENOL ++
			** REPORTED AS
/	•		2 T & L-TETPACHI DODOUENDI

### BASE/NEUTRAL EXTRACTABLES METHOD 625

***************************************			
ANCUNT	PARAMETER	TRUONA	PARAMETER
MG/KG		M6/K6	
2222222	***************************************	:22223	***************************************
(1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	(1	2, 1-dinitrotoluene
<1	1,4-DICHLOROSENZENE	13	FLUCRENE
. (1	1,2-DICHLOROBENZENE	<b>(1</b>	DIETHYLPHTHALATE
(1	HEXACHLORGETHANE	<1	N-NITROSODIPHENYLAMINE
(1	N-NITROSO-DI-N-PROPYLAMINE	(1	4-BROMOPHENYL PHENYL ETHER
(1	NITROBENZENE	(1	HEXACHLOROBENZENE
<b>(1</b>	ISCPHORONE	14	PHENANTHRENE
(1	BIS(2-CHLORGETHOXY) METHANE	195	ANTHRACENE
a	1, 2, 4-TRICHLOROBENZENE	₹1	DIBUTYL PHTHALATE
d	NAPHTHALENE	(1	FLUORANTHENE
T)	HEXACHLOROBUTAO LENE	<1	PYRENE
(1	HEIACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLGRONAPHTHALENE	⟨1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	1	CHRYSENE
(I	DIMETHYLPHTHALATE	<1	3,3'-DICHLROBENZIDINE
a	2,6-DINITROTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
• •		(1	BENZ (A) PYRENE

DATE: #3 JAN 85

MA

LAB #: 84-1828 ITEN #: 9 SAMPLE: Z1618

### ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA HETHOD 3546

********************************		************************	
ANOUNT	PARAMETER	AMQUNT	PARAMETER
MG/KG		MG/KS	
********		1211188	*************************
(1	PHENGL	(1	2,4,6-TRICHLOROPHENOL
⟨1	2-CHLOROPHENOL .	(1	2,4-0INITROPHENOL
⟨1	2-NITROPHENOL	(1	4-NITROPHENOL
<1	2.4-DIHETHYLPHENOL	(1	2-METHYL-4, 6-9INITROPHENOL
· (1	2,4-DICHLOROPHENOL	515	PENTACHLOROPHENOL
(1	4-CHLORO-3-HETHYLPHENOL	12	TETRACHLOROPHENOL ++
			** REPORTED AS
/			2.3.4.5-TETRACHLOROPHENOL

### BASE/NEUTRAL EXTRACTABLES METHOD 625

		:::::::::::::::::::::::::::::::::::::::	
AMOUNT	PARAMETER	TRUONA	PARAMETER
M6/K6		H6/K6	
2 <b>23</b> 22222	***************************************	1222211	
<1	BIS(2-CHLORGETHYL) ETHER	(1	ACENAPHTHENE
<b>(1</b>	1.3-ACCHE CONDENZENE	(1	2, 4-DINITROTOLUENE
	1,4-DICHLOROBENZENE	(1	•
(1	1,2-DICHLORGBENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAHINE
(1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BRONOPHENYL PHENYL ETHER
(1	NITROBENIENE	(1	HEXACHLOROBENZENE
(1	ISOPHORONE	(1	PHENANTHRENE
(1	BIS(2-CHLOROETHOXY) METHANE	(1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	⟨1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	<1	FLUCRANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
à	HEXACHLOROCYCLOPENTADIENE	13	BUTYL BENZYL PHTHALATE
a	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	1	CHRYSENE
(1	DIMETHYLPHTHALATE	-(1	3,3'-DICHLROSENZIDINE
(1	2,4-DINITROTOLUENE		BISIZ-ETHYLHEXYLI PHTHALATE
**		<1	BENZ (A) PYRENE

BATE: 43 JAN 85

ME

n LEGAL

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LAB 4: 84-1929 ITEN 4: 18 SANPLE: Z1817

## ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3546

\$		*******	***************************************
anount Mg/kg	PARAMETER	AMOUNT MG/KG	PARAMETER
*******	***************************************	********	***************************************
<1	PHENOL	(1	2, 4, 6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
(1	2-NITROPHENOL	(1	4-NITROPHENOL
<1	2,4-DIHETHYLPHENOL	<1	2-HETHYL-4, 4-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	1829	PENTACHLOROPHENOL
, a	4-CHLORG-3-HETHYLPHENOL	71	TETRACHLOROPHENOL ++
			** REPORTED AS
			2.3.4.A-TETRACHI OROPHENOI

#### BASE/NEUTRAL EXTRACTABLES HETHOD 625

		:::::::::::::::::::::::::::::::::::::::	
ANGUNT	PARAMETER	AMOUNT	PARAMETER
H6/K6		M6/KG	
223 <b>223</b> 33	************************************	:::::::::::::::::::::::::::::::::::::::	
1>	BIS(2-CHLORGETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	(1	2,4-DINITROTOLUENE
	1,4-DICHLOROBENZENE	(1	FLUORENE
(1	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLORGETHANE	(1	N-MITROSODIPHENYLAHINE
(1	N-NITROSG-DI-N-PROPYLAMINE	(1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	(1	HEXACHLOROBENZENE
(1	ISOPHORONE	(1	PHENANTHRENE
<1	BIS(2-CHLCROETHOXY) METHANE	(1	ANTHRACENE
<b>(1</b>	1,2,4-TRICHLOROBENZENE	. (1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	(1	BENI (A) ANTHRACENE
(1	ACENAPHTHYLENE	CI CI	CHRYSENE
(1	DINETHYLPHTHALATE	(1	3,3'-DICHLROBENZIDINE
(1	2,4-DINITROTOLUENE	⟨1	BIS(2-ETHYLHEXYL) PHTHALATE
		(1)	BENZ (A) PYREME .

LAS 8: 84-1629

LEGAL

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ITEN 4: 11 SAMPLE: Z1816

### ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3548

18E484412191284118411411412128888773337122928238823328		*******	*********************
ANGUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
*******	***************************************	:2822224:	***************************************
a	PHENOL	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLGROPHENOL	(1	2,4-DINITROPHENOL
(1	2-NITROPHENOL	(1	4-NITROPHENOL
(1	2,4-DIHETHYLPHENGL	<1	2-HETHYL-4, 4-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	· (1	PENTACHLOROPHENOL
(1	4-CHLORO-3-HETHYLPHENOL	(1	TETRACHLOROPHENOL ++
			** REPORTED AS
			2,3,4,6-TETRACHLOROPHENOL

#### BASE/NEUTRAL EXTRACTABLES NETHOD 625

*******	***************************************	: 1111121	*************************
AMOUNT	PARAMETER	AMOUNT	PARAMETER
Me/Ke		M6/K5	
*******		******	22222222222222222222222277722222222222
a	BIS(2-CHLORGETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-DICHLORGBENZENE	G	2,4-DINITROTOLUENE
(1	1,4-DICHLORGSENZENE	(1	FLUORENE
(1	1,2-01CH 0909EN7ENE	<1	DIETHYLPHTHALATE
a	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
(1	N-NITROSO-DI-Y-PROPYLAMINE	<1	4-BROHOPHENYL PHENYL ETHER
<1	NITROBENZENE	(1	HEXACHLOROBENZENE
(I	ISOPHORONE	(1	PHENANTHRENE
(1	BIS(2-CHLORGETHOXY) METHANE	(1	ANTHRACENE
(1	1,2,4-TRICHLORGBENZENE	(1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
(1	HEXACHLOROCYCLOPENTADIENE	<b>&lt;1</b>	BUTYL BENZYL PHTHALATE
(1	2-CHLORGNAPHTHALENE	<1	Benz (a) anthracene
⟨1	ACENAPHTHYLENE	(1	CHRYSENE
(1	DINETHYLPHTHALATE	(1	3,3'-DICHLROBENZIDINE
(1	2,6-01NITROTOLUENE	⟨1	BIS(2-ETHYLHEXYL) PHTHALATE
	·	(i	BENZ (A) PYRENE

2,3,4,5-TETRACHLOROPHENOL

DATE: #2 JAN 85

Diff

LAB 8: 84-1926 ITEN 8: 12 SANPLE: Z1884

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA HETHOD 3546

198897771111111111111111111111111111111			2222222		
ANGUNT PARAMETER		PARAMETER	AHOUNT	PARAMETER	
HG/	K8	•	MG/KB		
***************************************		***************************************			
	(1	PHENGL	(1	2,4,6-TRICHLOROPHENOL	
	(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL	
	(1	2-NITROPHENOL	(1	4-NITROPHENOL	
	(1	2, 4-DINETHYLPHENOL	(1	Z-HETHYL-4, 6-0 IN LTROPHENOL	
••	(1	2,4-DICHLOROPHENOL	⟨1	PENTACHLOROPHENOL	
•	1)	4-CHLORO-3-HETHYLPHENOL	(1	TETRACHLOROPHENOL ++	
				++ REPORTED AS	

### BASE/NEUTRAL EXTRACTABLES HETHOD 625

:::::::::::::::::::::::::::::::::::::::		2222222	***************************************
AHOUNT	PARAMETER	AMOUNT	PARAMETER
MS/KS		M6/K8	
:::::::::::::::::::::::::::::::::::::::	***************************************	********	
(1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
(1	1,3-DICHLOROBENZENE	(1	2,4-DINITROTOLUENE
⟨1	1,4-01CHLÜKUBERZERE	(1	FLUORENE
(1	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLORGETHANE	(1	N-NITROSOD IPHENYLAMINE
(1	N-NITROSO-9I-N-PROPYLAMINE	<1	4-BRONOPHENYL PHENYL ETHER
(1	NITROBENZENE	(1	HEXACHLOROBENZENE
(1	ISOPHORONE	(1	PHENANTHRENE
(1	BIS(2-CHLORGETHOXY) METHANE	(1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	(1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	(1	FLUGRANTHENE
(1	HEXACHLOROBUTADIENE	. (1	PYRENE
(1	HEXACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE
a	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	(1	
(1	DINETHYLPHTHALATE	,	3,3'-DICHLROBENZIDINE
(1	2.6-DINITROTOLUENE	a	•
11	Tèn Aturius in Aroruc	. (1	BENZ (A) PYRENE

DATE: 14 JAN 85

LAS 4: 84-1929 LTEN 4: 1

ITEM 4: 1 SAMPLE: Z1525



PCB'S METHOD 668

12722512	***************************************
AMOUNT	PARAMETER
K6/K6	
*******	**************************
•	
⟨€.5	PCB GROUP 1
₹ ₹ 1	PCB SROUP 2
<b>(5.85</b>	PCB GROUP 3
⟨\$.\$5	PCB SROUP 4
(6.65	PCB SROUP 5
•	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.
PCB GROUP-2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1916, 1242,
AND 1248 AND IS CALCULATED AS
1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262
AND IS CALCULATED AS 1268.

BATE: 14 JAN 85

LAS 8: 84-1929

LTEN 4: 2

SAMPLE: Z1987

PCB'S METHOD 698

*********	**********************	48
AMOUNT	PARAMETER	
HG/KB		
1212272572	****************	_

(6.25 PC8 SROUP 1
(6.1 PC8 SROUP 2
(6.65 PC8 SROUP 3
(6.65 PC8 SROUP 4
(6.65 PC8 SROUP 5
6 TOTAL PC8

PCB GROUP 1 INCLUDES PCB 1221 AND IS

CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS

CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1216, 1242,

AND 1248 AND IS CALCULATED AS

1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS

CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262

AND IS CALCULATED AS 1268.

20/49

DATE: 14 JAN 85

LAB #: 84-1928 ITEM #: 3 SAMPLE: ZIB19



PCB'S METHOD 688

***************************************				
AHOUNT	PARAMETER			
He/Ke	•			
********				
(5.5	PCB GROUP 1			
(\$.1	PCB GROUP 2			
(1.45	PCB EROUP 3			
(1.95	PCB GROUP 4			
(1.15	PCB GROUP 5			
•	TOTAL PCB			

PCB GROUP I INCLUDES PCB 1221 AND IS

CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS

CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242,

AND 1248 AND IS CALCULATED AS

1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS

CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262

AND IS CALCULATED AS 1268.

DATE: 14 JAN 85

ITEN 4:

SAMPLE: Z1968

PCB'S METHOD 648

AMOUNT PARAMETER **(J.25** PCB GROUP 1 PCB EROUP 2 ⟨€.1 PCB SROUP 3 PCB GROUP 4 (6.85 PCB GROUP 5 TOTAL PCB

PCB GROUP I INCLUDES PCB 1221 AND IS CALCULATED AS 1221. PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232. PCB GROUP 3 INCLUDES PCB'S 1516, 1242, AND 1248 AND IS CALCULATED AS 1242. PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254. PCB GROUP 5 INCLUDES PCB'S 1258 AND 1262 AND IS CALCULATED AS 1260.

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DATE: 14 JAN 85

LAB 4: 84-1925

LTEM 4: 5

SAMPLE: ZIMM9

PCB'S METHOD 688

*******	14222222222			
AMOUNT	PARAM	PARAMETER		
NG/KG				
*******	1422122222			
⟨€.25	PCB GROUP	1		
⟨€.1	PCB SROUP	2		
(8.85	PCB GROUP	3		
<b>(9.45</b>	PCB GROUP	4		
(8.65	PCB GROUP	5		
•	TOTAL. PCB			

PCB GROUP 1 INCLUDES PCB 1221 AND IS

CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS

CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242,

AND 1248 AND IS CALCULATED AS

1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS

CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262

AND IS CALCULATED AS 1268.

43/49

DATE: 14 JAN 85

LAB 4: 84-1828 FCK ITEN 9: 6

SAMPLE: ZISIS

PCB'S METHOD 668

22222222	***************************************	
AMOUNT	PARAMETER	
ME/KB		
***************************************		

(8.23 PCB GROUP 1 (8.1 PCB GROUP 2 .89 PCB GROUP 3 (8.85 PCB GROUP 4 (8.85 PCB GROUP 5 .89 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1240 AND 1262
AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

LAB 4: 84-1929 ITEM 4: 7.

SAMPLE: ZIGII

PCB'S METHOD 698

ANGUNT PARAMETER

NG/KG

(9.25 PCB GROUP 1

(9.1 PCB GROUP 2

(9.85 PCB GROUP 3

(9.85 PCB GROUP 4

(9.85 PCB GROUP 5

6 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1246 AND 1262
AND IS CALCULATED AS 1268.

DATE: 14 JAN 85

LAB 1: 84-1925 ITEN 1: 3

SAMPLE: ZIS12

PCB'S METHOD 408

AMOUNT PARAMETER

MG/KG

(8.75 PCB GROUP 1

(8.25 PCB GROUP 2

(6.15 PCB GROUP 3

(8.15 PCB GROUP 4

(8.15 PCB GROUP 5

9 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1258 AND 1262
AND IS CALCULATED AS 1268.

## LEGA!

DATE: 14 JAN 85

LAB #: 94-192# LTEN #: 9

SAMPLE: 21918

PCB'S METHOD 668

AMOUNT PARAMETER NG/KG

- (18 PCB GROUP 1
- (18 PCB GROUP 2
- (5 PCB GROUP 3
- (5 PCB GROUP 4
- (5 PCB GROUP 5
- # · TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242, AND 1248 AND IS CALCULATED AS 1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.

PCB GROUP 5 INCLUDED PCB'S 1248 AND 1262
AND IS CALCULATED AS 1268.

47/49

DATE: 14 JAN 85

LAB 9: 94-1925 ITEN 4: 18 SAMPLE: Z1917



PCB'S METHOD 688

******	******************************
AMOUNT	PARAMETER
NG/KB	
*******	****************************
(144	PCR GROUP 1
<b>&lt;198</b>	PCB GROUP 2
(58	PCB SROUP 3
<5€	PCB GROUP 4
(56	PCB GROUP 5
•	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262
AND IS CALCULATED AS 1268.

ITEN #: 11

SAMPLE: 21416

PCB'S METHOD 688

*******	****	******	***********************	
ANGUNT HG/KS	PARAMETER			
********	18227:	******	***************************************	
(6.25	PCB	GROUP	1	
(1.1	PC3	GROUP	2	
(5.55	PCB	<b>EROUP</b>	3	
(1.45	PCB	GROUP	4	
(8.95	PC8	GROUP	5	
	TOTA	M PCB		

PCB GROUP, I INCLUDES PCB 1221 AND IS CALCULATED AS 1221. PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232. PCB GROUP 3 INCLUDES PCB'S 1915, 1242, AND 1248 AND IS CALCULATED AS 1242. PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254. PCB GROUP 5 INCLUDES PCB'S 126# AND 1262 AND IS CALCULATED AS 1248.

DATE: 14 JAN 85

LAB 4: 84-1629 ITEM 4: 12 SAMPLE: Z1664



PCB'S METHOD 648

ANCUNT NG/KS		PARAMETER	
(\$.5	PCB GROUP	1	
(1.1	PCB GROUP	2	
(6.65	PCB SROUP	3	
(9.45	PCB GROUP	4	
(9.45	PCB GROUP	5	
•	TOTAL PCB		

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1816, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262
AND IS CALCULATED AS 1268.

SAMPLE: Z1929



PCB'S METHOD 688

PARAMETER
*******************************
PCB GROUP 1
PCB SROUP 2
PCB GROUP 3
PCB SROUP 4
PCB GROUP 5
TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221. PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232. PCB GROUP 3 INCLUDES PCB'S 1316, 1242, AND 1248 AND IS CALCULATED AS 1242. PCB GROUP 4 INCLUDES FCB 1254 AND (S CALCULATED AS 1254. PCB GROUP 5 INCLUDES PCB'S 126# AND 1262 AND IS CALCULATED AS 1250.

39/49

DATE: 14 JAN 85

LAB #: 84-1625

ITEM 4: 2 SAMPLE: Z1667



PCB'S METHOD 668

ANGUNT PARAMETER NG/KB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1616, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1234 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1266 AND 1262
AND IS CALCULATED AS 1256.

DATE: 14 JAN 85

LAB 4: 84-1926 ITEN 4: 3 SAMPLE: 21819



PCB'S

AMOUNT MG/XG	PARAMETER .	
***************************************		
⟨\$.5	PCB GROUP	1
(#.1	PCB SROUP	2
(8.85	PCB EROUP	3
(6.95	PCB GROUP	4
(8.85	PCB GROUP	5
•	TOTAL PCB	•

PCB GROUP 1 INCLUDES PCB 1221 AND IS

CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS

CALCULATED AS 1232.

PCB GROUP J INCLUDES PCB'S 1916, 1242,

AND 1248 AND IS CALCULATED AS

1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS

CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1269 AND 1262

AND IS CALCULATED AS 1269.

DATE: 14 JAN 85

LAR 4: 84-1629 ITEN 4: 4 SAMPLE: Z1968

PCB'S METHOD 448

*******	***************************************
AMOUNT	PARAMETER
HE/KE	
*******	
⟨€.25	PCB GROUP 1
⟨€.1	PCB GROUP 2
(8.65	PCB GROUP 3
(4.65	PCB GROUP 4
<b>(6.85</b>	PCB GROUP 5
1	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221. PC8 GROUP 2 INCLUDES PC8 1232 AND IS CALCULATED AS 1232. PCB GROUP 3 INCLUDES PCB'S 1#16, 1242, AND 1248 AND IS CALCULATED AS 1242. PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254. PCB EROUP 5 INCLUDES PCB'S 1269 AND 1262 AND IS CALCULATED AS 1260.

22/49

DATE: 14 JAN 85

LAS 4: 84-1928 LTEN 8: 5

SAMPLE: ZIMM

PCB'S METHOD 688

********	
AMOUNT	PARAMETER
NG/KG	
********	***************************************
⟨€,25	PCB GROUP 1
⟨€.1	PCB SROUP 2
(6.65	PCB SROUP 3
₹8.45	PCB GROUP 4
<8.65	PCB GROUP 5
•	TOTAL. PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS

CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS

CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1816, 1242,

AND 1248 AND IS CALCULATED AS

1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS

CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1266 AND 1262

AND IS CALCULATED AS 1266.

43/49

DATE: 14 JAN 85

LAB 8: 84-1828 FCK ITEN 8: 5

SAMPLE: Z1916

PCB'S METHOD 658

AMOUNT PARAMETER NG/KB

(8.25 PCB SROUP 1
(8.1 PCB SROUP 2
.89 PCB GROUP 3
(8.65 PCB GROUP 4
(6.95 PCB GROUP 5
.89 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1816, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262
AND IS CALCULATED AS 1268.

DATE: 14 JAN 85

LAB 4: 84-1028 ITEM 4: 7 SAMPLE: Z1611

> PCB'S METHOD 648

*******	***************************************
ANOUNT	PARAMETER
HG/KS	•
*******	
⟨€.25	PCB GROUP 1
⟨∅.1	PCB SROUP 2
(6.65	PCB GROUP 3
(8.65	PCB GROUP 4
<b>(9.95</b>	PCB GROUP 5
•	TOTAL PCS

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1240 AND 1262
AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

LAB 4: 84-1928 ITEN 4: 8

SAMPLE: ZIØ12

PCB'S METHOD 608

AMOUNT HG/KG	PARAMETER
(8.75	PCB GROUP 1
⟨€.25	PCB GROUP 2
(8.15	PCB EROUP 3
⟨€.15	PCS GROUP 4
⟨€.15	PCB GROUP 5
4	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1248 AND 1242
AND IS CALCULATED AS 1268.

### LEGA!

DATE: 14 JAN 85

LAB #: 34-1926 LTEN #: 9

SAMPLE: ZIGIB

PCB'S

ANOUNT PARAMETER

NG/KG

<19 PCB GROUP 1

<19 PCB GROUP 2

<5 PCB GROUP 3

(S PCB GROUP 4 (S PCB GROUP 5 I TOTAL PCB

PCB GROUP I INCLUDES PCB 1221 AND IS

CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS

CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1816, 1242,

AND 1248 AND IS CALCULATED AS

1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS

CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262

AND IS CALCULATED AS 1268.

47/49

DATE: 14 JAN 85

LAB 8: 94-1026 ITEM 8: 16 SAMPLE: Z1617 Der

PCB'S METHOD 648

AMOUNT NS/KS						
(128	PCB SROUP	***************************************				
	PCB SROUP	•				
		•				
<5₽	PCB GROUP	2				
₹5€	PCB GROUP	4				
₹5€	PCB GROUP	5				
ı	TOTAL PCB	•				

PCB GROUP 1 INCLUDES PCB 1221 AND IS

CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS

CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,

AND 1248 AND IS CALCULATED AS

1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS

CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262

AND IS CALCULATED AS 1268.

DATE: 14 JAN 85

LAB 8: 84-1828 ITEN 8: 11 SAMPLE: Z1516

: Tiale

*******	<del>1888   1</del>   1888   188
ANOUNT NG/KB	PARAMETER
	######################################
(8.25	PCB GROUP 1
<b>(5.1</b>	PC8 GROUP 2
(8.85	PCB GROUP 3
(6.65	PCB GROUP 4
(4.65	PCB GROUP 5
•	TOTAL PCB

PCB'S METHOD 648

PCB GROUP 1 INCLUDES PCB 1221 AND IS

CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS

CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1616, 1242,

AND 1248 AND IS CALCULATED AS

1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS

CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1266 AND 1262

AND IS CALCULATED AS 1266.

DATE: 14 JAN 85

LAB #: 84-1928 ITEN #: 12 SAMPLE: Z1884



PCB'S METHOD 648

ANGUNT NE/KE	PARAM	ETER
	:= 45 ±432 453:	***************************************
(8.5	PCB GROUP	1
⟨#.1	PCB GROUP	2
(8.65	PCB SROUP	. 2
(9.95	PCB GROUP	4
(6.65	PCB GROUP	5
•	TOTAL PCB	

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1266 AND 1262
AND IS CALCULATED AS 1266.

[ATE: 93 JEX 85

SAMPLE: 21817

LAB 4: E4-1820 TTER 4: 18 LEGAL

24/49

ACID EXTRACTABLES

KETHOD 625

ELIRACTED BY RORA METHOD 35

ANGUNT FRESKETER .

7.5/KE

AKSBUT.

rc/rE

KI FHENOL

C1 7-DR DEDEKENTE

2-NITEGRHENOL

-<1 2,4-DIRETHYLPHENOL

<1 2,4-DICHLOROFHENOL</p>

1 4-CM CRO-3-RETHYLTHENDI

(1 . 2,4,6-TRICHLOROPHENOL

41 2,4-DINITROPHEND

(1 4-NITEDPHENDE

<1 7- NETHYL-4, 8-101 WITROPHENOL >

1828 PENTACHLOROPHENOL-

J1 - JETRACHE OROPHENOL 48

\*\* REPORTED AS 2,3,4,6-TETRACHLOROPHENDL

#### EASE/NEUTRAL EXTRACTABLES RETHOD 625

AKOUNT RS/K <b>S</b>	PARAMETER	AMBUNT M5/k <b>g</b>	PARAMETER
*::##::	************************************	3 3334234	::::::::::::::::::::::::::::::::::::::
⟨1	BIS(2-CHLORGETHYL) ETHER	(1	ACENAPHTHENE
a	1,3-DICHLORGSENZENE	. (1	2, 4-DINITROTOLUENE
(1	1,4-DICHLOSGEENSENE	(1	•
(1	1,2-DICHLOROSENZEME	<1	DIETHYLPHTHALATE
(1	HEXACHEDROSTHAME	(1	N-NITROSODIPHENYLARINE
<1	N-NITROSO-DI-N-PROPYLAMINE	(1	4-EPONOPHENYL PHENYL ETHER
(1	NITROPENTEME	. (1	HETACHLOPCSENTENE
<b>(1</b> )	ISGFHOREXE	1>	PHENANTHEENE
<1	PISCE-CHECROETHOLY) NETHANE	(1	ANTHRACEME .
(1	1,2,4-Trichlorgberzene	<1	DIEUTYL PHIMALATE
<b>(1</b>	Naththalene	(1	FLUORANTHENE
<1	HE1ACHLGFORUTADIENE	(1	PYRENE
(1	HETACHLOROCYCLOPENTADTENE	CI CI	PUTYL BENZYL PHIHALATE
(1	2-CHLERCNAPHTHALENE		EENZ (A) ANTHRACENE
(1	ACEMANTHYLENE .	(1	CHRYSENE
(1	DIRETHYLFHTHALATE	(1	3,3'-DICHLEOSENZIDINE
<1	2,6-DINITEDIGLUENE	. (1	FISIZ-ETHYLHEIYL) FHTHALATE .
	•	. a.	EENZGAIPYEENE

### DEPARTMENT OF ENVIRONMENTAL QUALITY Request for Analysis

1 . T		Reque	st for i	Analysis		Laboratory No. 84-1020					
Location/	site: Jime Oil	Date: 12	Dec 8	1	<del></del>	Date Received Lab: DEC 13 1981 1245					
Collected	By: RFG, JLS	Program: <u>4</u>	290	<del></del>		Date Reported: JAN 15 1035 ,					
	RCRA Ste Survey					Report Data To: State Smits					
	Comments: Samples Lacked in Reserver # 1208 overnight and comment for log-in 13 Por 84 lab prepared										
C (P) unpre		*Sample Co				labdon't rinse; Organic(X) mason jar  Test Required					
Atem NO.	Sampling Point Description  (include time)	Nutrients .Basic	_	Metals Organic		rest Required					
	Composite Sail core (surface + 1' + 2'h 7')				21020	EP Lead					
1	See map for location					GC/ms - Acids, BN PCB's					
1. 2					21007	u :					
	The second secon				Z1014	V					
					21008	"					
4											
					21009	· ·					
5					21010	- 1/					
6											

.

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# 2/2 DEPARTMENT OF ENVIRONMENTAL QUALITY Request for Analysis

THENT OF ENVIRONMENTAL QUALITY		
Request for Analysis	Laboratory No.	84-102

•	The state of the s		·	·		Report Data To:
	eserved: Nutrient (R) add H <sub>2</sub> SO <sub>4</sub> in	field; Met	als (Tm)	HNO <sub>1</sub> ad	ded in 1	lab pre abdcn't rinse; Organic(X) mason j
Item No.	Sampling Point Description (include time)	*Sample Co			#'s	Test Required
1	The state of the s				21011	EP tox Pb II GCIMS acidIBN PCB'S
8					21012	u
9					21018	(i
10					21017	<b>(1</b>
11	<b>"</b>				21016	u
12	(1				21004	V TOLS010644

#### DEPARTMENT OF ENVIRONMENTAL QUALITY Laboratory Data Sheet

 Laboratory No:
 84-1020

 Program Code:
 4290

 Page:
 1 of:

	Time	0:1			RFG Analysis Completed: JAN 0.4						0 A 13°E		
	Item No.				 Test Results (All units immg/lor					ug/m <sup>h</sup>			
		bag#	EP Tox Pb			,							
•	1	Z 1020	20.1										
	ಎ	₹1007	<0.1										
	3	21019	۷٥.۱										
	4	<del>2</del> 1008	<0.1								<u>                                     </u>		
	_5_	P001 5	20,1										
	6	21010	<0.1										
•	7	11015	<0.1										
	8	₹1012	<0.1	:									
ላ	. 9	81015	<0.1										
	. 10	21017	<0.1			•							
•	11	21016	20.1										
	12	P0015	<0.1										
•	*******												
	<del></del>												
											<u> </u>		
٠											<b>T</b> 0.		

Comments: \_\_\_\_\_\_TOLS010645 \_\_\_\_

DATE: 31 DEC 84

#: 84-1929 B)

ITEM 4: 1 SAMPLE: Z1929

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3546

******	****************	**********	*******	**************
THUONA	PARAMETER		AMOUNT	PARAMETER .
M6/KB	•	₹'	M6/K6	
23122242	***************************************	2532222233	********	**********************
· (1	PHENOL		a	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL		(1	2,4-DINITROPHENOL
(1	2-MITROPHENOL		1	4-MITROPHENOL
(1	2,4-DIMETHYLPHENGL		(1	2-METHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	•	(1)	PENTACHLOROPHENOL
(1	4-CHLORO-3-HETHYLPHENOL		(1	TETRACHLOROPHENOL ++
•				## REPORTED AS
				2,3,4,6-TETRACHLOROPHENOL

### BASE/NEUTRAL EXTRACTABLES METHOD 625

************************************		*******	**********************
ANOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
: : : : : : : : : : : : : : : : : : :	***************************************	222222	
(1	BIS(2-CHLORGETHYL) ETHER	a	ACENAPHTHENE
<1	1,3-DICHLORGBENZENE	(1	2,4-DINITROTOLUENE
(1	1,4-DICHLOPOSENZENE	(1	<u>EL HOPENE</u>
(1	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAHINE	<b>(1</b>	4-BROMOPHENYL PHENYL ETHER
(1	NITROBENZENE	CI	HEXACHLOROBENZENE
(1	ISOPHERONE	<1	PHENANTHRENE
₹1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	· (1	FLUORANTHENE
<1	HEXACHLOROSUTADIENE	(1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	C1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	(1	CHRYSENE .
(1	DIMETHYLPHTHALATE	· (1	3,3'-DICHLROBENZIDINE
<1	2,6-DINITROTOLUENE	.(1	BIS(2-ETHYLHEIYL) PHTHALATE
		(1	BENZ (A) PYRENE

DATE: 31 DEC 84

ME

LAB 1: 48-1929 ITEN 1: 1 SAMPLE: Z1929

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3546

ANOUNT PARAMETER
MG/KG

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- 45 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-NONACHLOR
- <5 P,P'-90E
- (S DIELDRIN
- (5 ENDRIN
- (5 ENDOSULFAN II
- (5 P,P'-000
- **K5** ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 SAMMA-BHC (LINDANE)

Pyto

31 DEC 84

SC/MS SCAN ID

84-1020 71020

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

LAD 4: 84-1929

Dell

LEGAL

5/49

ITEM 4: 2 SAMPLE: 21867

### ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3546

***************************************		2 12222323	***************************************
AMOUNT	PARAMETER	AMOUNT	PARAMETER
MS/KS		MG/KS	•
2555532	***********************************	* ********	******************************
·	PHENOL	(1	2, 4, 6-TRICHLOROPHENOL
ä	2-CHLOROPHENOL	- (1	2,4-DINITROPHENOL
(1	2-NITROPHENOL	(1	4-MITROPHENOL
a	2,4-DIMETHYLPHENOL	(I	2-HETHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
(1	4-CHLGRO-3-METHYLPHENOL	(1	TETRACHLOROPHENOL ++
	• •		** REPORTED AS
			2,3,4,6-TETRACHLOROPHENOL

#### BASE/NEUTRAL EXTRACTABLES METHOD 625

11111111	122222222222222222222222222222222222222	122553333	************************
ANCUNT	PARAMETER	AMOUNT	PARAMETER
Me/Ke		. MG/KG	
2222222	***************************************	********	######################################
(1)	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
⟨1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
(1	1,4-DICHLOROBENZENE	(1	FLUORENE
⟨1	1,2-DICHLOROBENZENE	<b>(1</b>	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
(1	H-KITROSO-DI-H-PROPYLANINE	(1	4-BRONGPHENYL PHENYL ETHER
<1	NITROBENZENE	⟨1	HEXACHLOROBENZENE
· (1	ISOPHORONE	<b>(1</b>	PHENANTHRENE
(1	81S(2-CHLORGETHOXY) METHANE	(1	ANTHRACENE .
(1	1,2,4-TRICHLOROBENZENE	(1	DIBUTYL PHTHALATE
⟨1	NAPHTHALENE	(1	FLUORANTHENE
(1	HEIACHLOROBUTAOTENE	1>	PYRENE
(1	HEXACHLOROCYCLOPENTADIENE	. (1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	(1	CHRYSENE
(1	DIMETHYLPHTHALATE	(1	3,3'-DICHLROSENZIDINE
(1	2,5-DINETROTOLUENE	1)	BIS(2-ETHYLHEXYL) PHTHALATE
		. (1	BENZ (A) PYRENE .

ITEN #: SAMPLE: Z1867

> PESTICIDES HETHOD 625 EXTRACTED BY RCRA 3548

MS/KS

- ⟨5 ALPHA-BHC
- ⟨\$ HEPTACHLOR
- **<5** ALDRIN
- ⟨5 HEPTACHLOR EPOXIDE
- ENDOSULFAN I
- ⟨5 TRANS-NONACHLOR
- ⟨5 P,P'-DDE
- **<5** DIELDRIN
- ENDRIN
- ⟨5 ENDOSULFAN II
- ⟨5 P,P'-000
- ENDOSULFAN CYCLIC SULFATE ⟨5
- ⟨5 P, P'-00T
- GAMMA-BHC (LINDANE)

≥#1 - 1#<u>-</u>

LEGAL

Ø2 JAN 85

GC/MS SCAN ID

84-1020 Z1007

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRICRITY POLLUTANT CHEMICALS. THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 28 DEC 84

LAB 9: 84-1833 ITEM 9: 3 SAMPLE: Z1819

### ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA HETHOD 3546

*******	***********************************	*****	
AMOUNT MG/KG	PARAMETER	angunt Me/Ke	PARAMETER .
******		2553555	
. (1	PHENOL	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	<b>(1</b>	2,4-DINITROPHENOL
(1	2-NITROPHENOL	(1	4-NITROPHENOL
<1	2,4-0INETHYLPHENOL	<1	2-METHYL-4, 4-DINITROPHENOL
(1	2, 4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
(1	4-CHLORO-3-HETHYLPHENOL	্ব	TETRACHLOROPHENOL ++
			** REPORTED AS
			2 3 4 A-TETRACHI OROPHENO

### BASE/NEUTRAL EXTRACTABLES METHOD 625

***************************************		:222222	
ANOUNT	PARAMETER	AMOUNT	PARAMETER
MG/KS		MG/KG	
18222377	***************************************	252523631	
(1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	⟨1	2,4-DINITROTOLUENE
(1	1,4-DICHLOROBENZENE	(1	FLUORENE
<1	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	(1	N-NITROSOD [PHENYLANINE
1)	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROHOPHENYL PHENYL ETHER
⟨1	NITROBENZENE	(1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
(1	BIS(2-CHLOROETHOXY) METHANE	(1	ANTHRACENE
⟨1	1,2,4-TRICHLOROBENZENE	· (1	DIBUTYL PHTHALATE
(I	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
. (1	HEXACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	1)	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLEHE	(1	CHRYSENE
(1	DIMETHYLPHTHALATE	₹1	3, 3°-DICHLROBENZIDINE
(1	2,6-DINITROTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
.•		(1	BENZ (A) PYRENE

DATE: 28 DEC 84

ITEM #: 3 SAMPLE: ZIS19

> PESTICIDES METHOD 625 EXTRACTED BY RCRA 3540

PARAMETER ANOUNT MG/KB

> ⟨5 ALPHA-BHC

- **<5** HEPTACHLOR
- ⟨5 ALDRIN
- **<**5 HEPTACHLOR EPOXIDE
- ⟨5 ENDOSULFAN I
- **(5** TRANS-HONACHLOR
- P, P'-0DE ⟨5
- (5 DIELDRIN
- (5 ENDRIN
- ENDOSULFAN II
- ⟨5 P,P'-900
- ENDOSULFAN CYCLIC SULFATE
- P.P'-00T
- GAMMA-BHC (LINDAME)

BILL

28 DEC 84

<u>GC/MS SCAN ID</u>

84-1020 21019

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

2,3,4,6-TETRACHLOROPHENOL

DATE: 31 DEC 84 DAY

LAN 4: 84-1929 LTEN 8: 4 SAMPLE: Z1998

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3546

*********************************		1622222	********************
ANOUNT M6/K8		AMOUNT MG/KG	PARAMETER
*******		******	
(1	PHENOL.	<b>(1</b>	2, 4, 6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
- (1	2-NITROPHENOL	(1	4-NITROPHENOL
<1	2,4-BINETHYLPHENOL	(1	2-METHYL-4, 6-0 IN ITROPHENOL
<1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
<1	4-CHLORO-3-HETHYLPHENOL	(1	TETRACHLOROPHENOL ##
,			** REPORTED AS

BASE/NEUTRAL EXTRACTABLES METHOD 625

********	*******************************	:2222222	12291252222222222222222222222222222
ANOUNT MG/KB	PARAMETER	ANGUNT HG/KG	PARAMETER
22227382	######################################	2332222	بالمستعمر ا
(1	BIS(2-CHLOROETHYL) ETHER	(1_	ACENAPHTHENE CONTRACTOR OF THE PROPERTY OF THE
⟨1	1,3-01CHLCROBENZENE	3	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	1	FLUORENE ou F
<1	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE )
⟨1	HEXACHLORGETHANE	2	N-NITROSODIPHENYLANINE
<1	N-MITROSO-OI-N-PROPYLAMINE	(1	4-BROMOPHENYL PHENYL ETHER
(1	NITROBENZENE	. (1	HEXACHLOROBENZENE
1	ISOPHORONE	1	PHENANTHRENE
<1	8IS(2-CHLOROETHOXY) METHANE	1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	(1	FLUORANTHENE
<1	HEXACHLGROBUTADIENE	(1	PYRENE
(1	HEXACHLOROCYCLOPENTAD I ENE	(1.	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	(1	CHRYSENE
<1	DIHETHYLPHTHALATE	(1	3,3'-OICHLROBENZIDINE
(1	2, 6-DINITROTOLUENE	(1	BIS(Z-ETHYLHEXYL) PHTHALATE
	•	⟨1	BENZ (A) PYRENE "

LAB #: 84-1929 ITEN 4: SAMPLE: ZISSE

> PESTICIDES HETHOD 625

AMOUNT

PARAMETER

(5

- HEPTACHLOR **<5**
- **(5** ALDRIN
- ⟨5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-NONACHLOR
- **<5** P,P'-0DE
- DIELDRIN (5
- ⟨5 ENDRIN
- **<5** ENDOSULFAN II
- P,P'-000 (5
- ENDOSULFAN CYCLIC SULFATE
- P,P'-00T
- GANNA-BHC (LINDANE)

MC

31 DEC 84

#### GC/MS SCAN ID

84-1020 Z1008

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KB
NONANE	1
DECANE	4
4-METHYLDECANE	3
UNDECANE	. 1 <b>9</b>
2-METHYLUNDECANE	8
DODECANE	46
TRIDECANS	67
7-METHYLTRIDECANE	38
HENEICOSANE	37

DATE: 28 DEC 84

MA

LAB 8: 84-1928 ITEN 8: 5 SAMPLE: 21889

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3548

AHOUNT MG/KG	PARAMETER	ANGUNT MG/KB	PARAMÉTER
********	######################################	12222372	\$#####################################
<1	PHENOL.	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	. (1	2,4-DINITROPHENOL
(1	2-NITROPHENOL	· (1	4-NITROPHENOL
(1	2,4-DINETHYLPHENOL	· (1	Z-HETHYL-4, 6-DINITROPHENOL
(1)	2, 4-0 I CHLOROPHENOL	(1	PENTACHLOROPHENOL
(1	4-CHLORO-3-METHYLPHENOL	. (1	TETRACHLOROPHENOL ++
			++ REPORTED AS
			2,3,4,6-TETRACHLOROPHENOL

### BASE/NEUTRAL EXTRACTABLES METHOD 425

		*******	
ANOUNT	PARAMETER	AMOUNT	PARAMETER
MS/KS		MG/KS	
********	***************************************	22222888	************************
(1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	(1	2,4-OINITROTOLUENE
(1	1,4-DICHLOROBENZENE	(1	FI UORENE
(1	1,2-OICHLOROBENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLANINE
`(1	N-MITROSO-DI-M-PROPYLAMINE	ĆÎ.	4-BRONOPHENYL PHENYL ETHER
(1	NITROBENZENE	(1	HEXACHLOROBENZENE
(1	ISOPHORONE	<1	PHENANTHRENE
(1	BIS(2-CHLORGETHOXY) METHANE	<b>&lt;1</b>	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE .	. (1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
. (1	HEXACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	(1	CHRYSENE
a	DIMETHYLPHTHALATE	· · · · <b>(1</b>	3,3'-DICHLROBENZIDINE
a	2,6-DINITROTOLUENE	4	BIS(2-ETHYLHEXYL) PHTHALATE
•	ay	(1	BENZ (A) PYRENE
		• •	

DATE: 28 DEC 84

MG

LAB 0: 84-1633 ITEM 4:5 SAMPLE: 21869

PESTICIDES
NETHOD 625.
EXTRACTED BY RCRA 3540

ANOUNT PARAMETER MG/KG

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-NONACHLOR
- (5 P,P'-00E
- 45 DIELDRIN
- (5 ENDRIN
- (5 ENDOSULFAN II
- (5 P,P'-000
- (5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 GAMMA-BHC (LINDANE)

EHI

16149

28 DEC 84

GC/MS SCAN ID

84-1020 21009

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

17/49

DATE: 28 DEC 84

ME

LAB #: 84-1633 ITEN #: 6 SAMPLE: Z1816

### ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3346

28422222		2022222	*****************************
AHOUNT HG/KG	PARAMETER	AMOUNT - NG/KG	PARAMETER
(1	PHENOL	· (1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	Ü	2,4-DINITROPHENOL
a	2-NITROPHENOL	(1	4-NITROPHENOL
a	2,4-DIMETHYLPHENOL	(1	2-METHYL-4,6-DINITROPHENOL
a	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
(1	4-CHLORO-3-HETHYLPHENOL	(1	TETRACHLOROPHENOL **
,	•		** REPORTED AS 2,3,4,6-TETRACHLOROPHENOL

### BASE/NEUTRAL EXTRACTABLES METHOD 625

3333333	***************************************	****	
AMOUNT	PARAMETER	AMOUNT	PARAMETER
H6/K6		M6/K6	
*******		2222222	
<1	BIS (2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<b>(1</b>	1,3-DICHLOROBENZENE	(1	2,4-DINITROTOLUENE
(1	1,4-DICHLORGBENZENE	(1	FLUORENE
(1	1,2-DICHLOROBENZENE	-(1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLANINE	, (1	4-BRONOPHENYL PHENYL ETMSR
<1	NITROBENZENE	₹1	HEIACHLOROBENZENE
(1	ISOPHORONE	. (1	PHENANTHRENE
(1	BIS(2-CHLOROETHOXY) METHANE	(1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	<1	FLUORANTHENE
<1	HE LACHLOROBUTADIENE	(1	PYRENE
(1	HEXACHLOROCYCLOPENTAD I ENE	(1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	a	BENZ (A) ANTHRACERE TOLS 010661
a	ACENAPHTHYLENE"	71	CHRYSENE
(1	DINETHYLPHTHALATE	. (1	3,3'-DICHLROSENZIDINE
a	2,6-DINITROTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
	,	(1)	BENZ (A) PYRENE

DATE: 28 DEC 84

LAB 4: 84-1533 ITEN 4: 6 SAMPLE: 71616

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 334#

ANOUNT PARAMETER
NG/KG

- 45 ALPHA-BHC
- (5 HEPTACHLOR
- 45 ALDRIN
- CS HEPTACHLOR EPOXIDE
- 45 ENDOSULFAN I
- (5 TRANS-NONACHLOR
- (5 P,P'-DDE
- (5 DIELDRIN
- 45 ENDRIN
- 45 ENDOSULFAN II
- (5 P,P'-DDD
- **45 ENDOSULFAN CYCLIC SULFATE**
- <5 P,P'-DDT
- (5 GAMMA-BHC (LINDAME)

MA

28 DEC 84

SC/MS SCAN ID

84-1020 Z1010

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

ATE: #3 JAN 85

ME

LAB #: 84-1928 ITEN #: 7 SAMPLE: Zi#11 20/49

### ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3546

*******	*****************************	2822222	***************
AHOUNT	PARAMETER	AMOUNT	PARAMETER
MS/KS		MG/KE	
2222333		*******	
(1	PHENOL	. (1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	(1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	(1	2-METHYL-4,6-DINITROPHENOL
a	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
₹1	4-CHLORO-3-HETHYLPHENOL	<b>&lt;1</b>	TETRACHLOROPHENOL ++
			## REPORTED AS
			2.3.4.A-TETRACHI OROPHENOI

### BASE/NEUTRAL EXTRACTABLES HETHOD 625

*******		2223222	
ANOUNT M6/K6	PARAMETER	AMOUNT MG/KS	PARAMETER
23223232	*************************************	82333322	************************************
<b>(1</b>	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	(1	2.4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	(i	FLUORENE
(1	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
a	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	(1	4-BROMOPHENYL PHENYL ETHER
⟨1	NITROBENZENE	<b>(1</b>	HEXACHLOROBENZENE
(1	ISOPHORONE	₹1	PHENANTHRENE
Ω	BIS(2-CHLOROETHOXY) METHANE	· <1	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	. (1	DIBUTYL PHTHALATE
(1	NAPHTHALENE	<1	FLUORANTHENE
. (1	HEXACHLOROSUTADIENE	<b>(1</b>	PYRENE
(1	HEXACHLOROCYCLOPENTADIENE	(I)	BUTYL BENZYL PHTHALATE
⟨1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
- (1	ACENAPHTHYLENE	·· (1	CHRYSENE
<1	DINETHYLPHTHALATE	(1	3,3'-DICHLROBENZIDINE
<1	2,6-DINITROTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
		<b>(1</b>	BENZ (A) PYRENE

21/49

DATE: #3 JAN 85

DSH

LAB #: 84-1829 ITEN #: 7 SAMPLE: 21811

PESTICIDES
NETHOD 625
EITRACTED BY RCRA 3546

AMOUNT PARAMETER NG/KG

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- C5 ALDRIN
- 45 HEPTACHLOR EPOXIDE
- 45 ENDOSULFAN I
- K5 TRANS-NONACHLOR
- (5 P,P'-DDE
- (5 DIELDRIN
- C5 ENDRIN
- 45 ENDOSULFAN II
- <5 P,P'-DDD
- (5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-DDT
- (5 GAMMA-BHC (LINDAME)

byll

Ø3 JAN 85

GC/MS\_SCAN ID

84-1020 71011

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: #3 JAN 85

MA

LEGAL

23/40

LAB #: 84-1020 ITEN #: 8 SAMPLE: Z1012

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3546

*******	*********************************	2222722	***************************
ANDUNT	PARAMETER	AHOUNT	PARAMETER
Ke/Ke		M6/K6	•
C2232422:		*******	H498224822222222222222222222222222222222
(1	PHENOL	(1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
1>	2-NITROPHENOL	(1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	(1	2-HETHYL-4,6-DINITROPHENOL
<b>(1</b>	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	(1	TETRACHLOROPHENOL **
			++ REPORTED AS

#### BASE/NEUTRAL EXTRACTABLES NETHOD 625

2222222	**************************	******	######################################
AMOUNT MG/KG	PARAMETER .	AMOUNT MG/KG	PARAMETER
EE#####		22232322	**************************************
<b>(</b> 1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE . Sauce .
(1	1,3-DICHLOROBENZENE	(1	2.4-DINITROTOLUENE , and a second of the sec
(1	1,4-DICHLOROBENZENE	13	FLUORENE
Ü	1,2-DICHLOROBENZENE	त	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLANINE
(1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<b>(1</b>	NITROBENZENE	<b>(1</b>	<u>HEXACHLOROBENZENE</u>
(1	ISOPHORONE	14	PHENANTHRENE
<b>(1</b>	BIS(2-CHLOROETHOXY) METHANE	165	ANTHRACENE
(1	1,2,4-TRICHLOROBENZENE	त	DIBUTYL PHTHALATE
<1	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	₹1	PYRENE
(1	HEXACHLOROCYCLOPENTADIENE	(1	BUTYL BENZYL PHTHALATE .
(1	2-CHLORONAPHTHALENE	1>	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	(1	CHRYSENE
<1	DINETHYLPHTHALATE	(1	3,3'-DICHLROBENZIDINE
CI ·	2,6-DINITROTOLUENE	(i	BIS(2-ETHYLHEXYL) PHTHALATE
		. (1	BENI (A) PYRENE

TOLS010667

2,3,4,6-TETRACHLOROPHENOL

DATE: #3 JAN 85

DI

LAB 0: 84-1928 ITEM 0: 8 SAMPLE: Z1912

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3548

ANOUNT PARAMETER
N6/K6

- CS ALPHA-BHO
- 45 HEPTACHLOR
- **45 ALDRIN**
- 45 HEPTACHLOR EPOXIDE
- KS ENDOSULFAN I
- **45 TRANS-NONACHLOR**
- (5 P,P'-DDE
- C5 DIELDRIN
- (5 ENDRIN
- C5 ENDOSULFAN II
- (5 P,P'-000
- C5 ENDOSULFAN CYCLIC SULFATE
- <5 P,P'-00T
- (5 GAMMA-BHC (LINDANE)

25/49

DH

Ø3 JAN 85

GC/MS SCAN ID

84-1Ø2Ø Z1Ø12

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

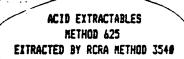
24/49

## LEGAL

DATE: #3 JAN 85

ME

LAB #: 84-1626 ITEN #: 9 SAMPLE: Z1618



*******	******************************	******	duy!
TMUONA	PARAMETER	THUOMA	PARAMETER SEPT WATER
Me/Ke		Me/Ke	المرامدر
*******		********	
(1	PHENOL	(1	2,4,6-TRICHLOROPHENOL
a	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
(1	2-NITROPHENOL	(1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-KETHYL-4,6-DINITROPHENOL
(1	2,4-DICHLOROPHENOL	515	PENTACHLOROPHENOL
(1	4-CHLORO-3-NETHYLPHENOL	(12	** REPORTED AS KITE - that why to have
			Se pero la de la lace
			** REPORTED AS REAL - There will be a series to be
,			2,3,4,6-TETRACHLOROPHENOL

### BASE/NEUTRAL EXTRACTABLES METHOD 625

222233	*****************************	#2E2#9E3	*************************
AHOUNT MG/KG	PARAMETER	AMOUNT Mg/kg	PARAMETER
222232		*******	***************************************
<1	BIS(2-CHLORGETHYL) ETHER	(1	ACENAPHTHENE
. (1	1,3-DICHLORDBENZENE	(1	2,4-DINITROTOLUENE
(1	1,4-DICHLOROBENZENE	(1	FLUORENE
(1	1,2-DICHLORGBENZENE	(1	DIETHYLPHTHALATE
· (1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
₹1	NITROBENZEME	<1	HEXACHLOROBENZENE
<b>(1</b>	ISOPHORONE	<1	PHENANTHRENE
(1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<b>(1</b>	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE TOLS010670
₹1	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	.(1	BUTYL BENZYL PHTHALATE
<b>(1</b>	2-CHLORCNAPHTHALENE	<1	BENZ (A) ANTHRACENE
(1	ACENAPHTHYLENE	1	CHRYSENE Year according
<b>&lt;1</b>	DINETHYLPHTHALATE	a	3,3'-DICHLROSENZIDINE
(1	2,6-DINITROTOLUENE	(-3	BIS(2-ETHYLHEXYL) PHTHALATE
,,,	- <b>y</b>	. (1	BENZ (A) PYRENE

DATE: #3 JAN 85

Nee

LAB #: 84-1926 ITEN #: 9 SAMPLE: Z1818

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3546

ANOUNT PARAMETER Mg/kg

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- (5 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-HONACHLOR
- (5 P,P'-00E
- (5 DIELDRIN
- (5 ENDRIN
- (5 ENDOSULFAN II
- (5 P,P'-000
- (5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5- GAMMA-BHC (LINDANE)

HE

Ø3 JAN 85

#### GC/MS SCAN ID

84-1920 21918

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND		MG/KG
DODECANE TRIDECANE PENTADECANE	•	6 8 6
CHINECOMIC		•

DATE: #3 JAN 85

W4

LEGAL

24/49

LAB 4: 84-1626 ITEM 4: 16 SAMPLE: ZI617

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3546

			*******************************		
AMC	THU	PARAMETER ·	AMCUNT	PARAMETER	
ME	S/KG		MG/KS		
2223	12223		188883881	**************	
	(1	PHENOL	(1	2, 4, 6-TRICHLOROPHENOL	
	(1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL	
	<b>(1</b>	Z-NITROPHENOL	<1	4-NITROPHENOL	
	<1	2,4-DIHETHYLPHENOL		2-METHYL-4, 6-DINITROPHENOL	
	(1	2,4-DICHLOROPHENOL	1829	PENTACHLOROPHENOL	
	(1	4-CHLORO-3-HETHYLPHENOL	71	TETRACHLOROPHENOL ++	
				** REPORTED AS	
				2 T A LITETPACUI DEPOUENCE	

### BASE/NEUTRAL EXTRACTABLES NETHOD 625

:2202:2721::::::::::::::::::::::::::::::		:222233	***************************************
AMOUNT	PARAMETER	AMOUNT	PARAMETER
MG/KG		M6/K6	
******	***************************************	22222122	***************************************
<1	BIS(2-CHLORGETHYL) ETHER	<1	acenaphthene
(1	1,3-DICHLORDSENZENE	(1	2,4-DINITROTOLUENE
(1	1,4-DICHLORGBENZENE	<1	FLUORENE
(1	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
(1	HÉXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
(1	N-NITROSO-DI-N-PROPYLANINE	(1	4-BROMOPHENYL PHENYL ETHER
(1	NITROBENIENE	(1	HEXACHLOROBENZENE
a	ISOPHORONE	(I	PHENANTHRENE
(I	BIS(2-CHLOROETHOXY) METHANE	a	
•	1,2,4-TRICHLOROBENZENE	ä	_
(1	NAPHTHALENE	d	FLUORANTHENE
ä	HEXACHLOROBUTAD LENE	a	PYRENE
ä	HEIACHLOROCYCLOPENTADIENE	ä	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	ä	BENZ (A) ANTHRACENE
à	ACENAPHTHYLENE	(1	
(1	DINETHYLPHTHALATE	(1	·····
		(1	•
⟨1	2,6-DINITROTOLUENE	••	
		(1	BENZ (A) PYRENE

DATE: #3 JAN 85

ITEN 4: 15 SAMPLE: ZIE17

> PESTICIDES METHOD 625 EITRACTED BY RCRA 3546

**AHOUNT** PARAMETER M6/K6

- ALPHA-8HC (5
- HEPTACHLOR **<5**
- ALDRIN (5
- HEPTACHLOR EPOXIDE **<5**
- ⟨5 ENDOSULFAN I
- TRANS-HONACHLOR (5
- ⟨5 P,P'-00E
- ⟨5 DIELDRIN
- **(5** ENDRIN
- ENDOSULFAN II **(5**
- **<5** P,P'-000
- ENDOSULFAN CYCLIC SULFATE (5
- **(5** P,P'-00T
- SAMMA-BHE (LINDAME)

M

Ø3 JAN 85

#### GC/MS SCAN ID

#### 84-1020 21017

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	M6/KG
1-ETHYL-4-METHYLCYCLOHEXANE	10
2,6-DIMETHYLOCTANE	1Ø
4-METHYLNONANE	8
1-METHYL-4-(1-METHYLETHYL)CYCLOHEXANE	12
4-METHYLDECANE	36
BUTYLCYCLOHEXANE	14
5-METHYLDECANE	15
3-METHYLDECANE	. 8
UNDECANE	18
OCTYLCYCLOPROPANE	53

THE SAMPLE ALSO CONTAINED NUMEROUS OTHER COMPOUNDS NOT IDENTIFIED. THE PATTERN, HOWEVER, WAS INDICATIVE OF A SOLVENT MIXTURE SIMILAR TO PAINT THINNER.

AB 8: 84-1929 D

LEGAL

32/49

ITEM 4: 11 SAMPLE: [1816

### ACID EXTRACTABLES METHOD 625 EXTRACTED BY RCRA METHOD 3346

22222222	***************************************	12227111	***********************
ANGUNT	PARAMETER	ANGUNT	PARAMETER
MG/KS		MS/KS	
(1	PHENOL	1)	2, 4, 6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	(1	2,4-DINITROPHENOL
(1	2-NITROPHENOL	(1	4-NITROPHENOL
(1	2,4-0IMETHYLPHENOL	(1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	(1	TETRACHLOROPHENOL ##
	•		++ REPORTED AS
			2, 3, 4, 6-TETRACHLOROPHENOL

### BASE/NEUTRAL EXTRACTABLES NETHOD 625

	:32222222222222333333333333333333333333	: <b>:::::</b> ::::::::::::::::::::::::::::::	
AMOUNT	PARAMETER	AMOUNT	PARAMETER
MG/KG		MG/KS .	
38282772	***************************************	12772736	
(1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
⟨1	1,3-01CHLOROBENZENE	(;	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
	1,2-DICHLOROBENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
(1	N-NITROSO-DI ·N-PROPYLAMINE	(1	4-BRONOPHENYL PHENYL ETHER
(1	NITROBENZENE	(1	HEXACHLOROBENZENE
(1	ISOPHORONE	(1	PHENANTHRENE
⟨1	BIS(2-CHLOROETHOXY) METHANE	(1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	1) (1)	DIBUTYL PHTHALATE
(1	NAPHTHALENE	(1	FLUORANTHENE
(1	HEXACHLOROBUTADIENE	(1	PYRENE
(1	HEXACHLOROCYCLGPENTADIENE	<1	BUTYL BENZYL PHTHALATE
(1	2-CHLORONAPHTHALENE	<1	BENZ (A) ANTHRACENE
· <1	ACENAPHTHYLENE	(1	CHRYSENE
<1	DIMETHYLPHTHALATE	(1	3,3'-OICHLROBENZIOINE
(1	2,6-DINITROTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
	•	(1	BENZ (A) PYRENE

DATE: 92 JAN 85

ME

LEGAL

ITEN #: 11 SAMPLE: I1016

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3546

ANOUNT PARAMETER
NG/KG

- (5 ALPHA-BHC
- (5 HEPTACHLOR
- 45 ALDRIN
- (5 HEPTACHLOR EPOXIDE
- (5 ENDOSULFAN I
- (5 TRANS-NONACHLOR
- (5 P,P'-00E
- 45 DIELDRIN
- (5 ENDRIN
- (5 ENDOSULFAN II
- <5 P,P'-000
- (5 ENDOSULFAN CYCLIC SULFATE
- (5 P,P'-00T
- (5 GAMMA-BHC (LINDAME)

HKE

Ø2 JAN 85

GC/MS SCAN ID

84-1929 Z1916

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 92 JAN 85

LAB 4: 84-1625

DJH

ITEM 4: 12 SAMPLE: Z1864

### ACID EXTRACTABLES METHOD 625 EITRACTED BY RCRA HETHOD 3540

******	######################################	18883538	
ANOUNT	PARAMETER	AMOUNT	PARAMETER .
M6/KS	•	ME/KS	·
******		********	***************************************
(1	PHENOL	. (1	2,4,6-TRICHLOROPHENOL
(1	2-CHLOROPHENOL	<b>(1</b>	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
(1	2,4-DIMETHYLPHENGL	(1	2-HETHYL-4, 6-0 IN ITROPHENOL
<b>(1</b>	2,4-DICHLOROPHENOL	(1	PENTACHLOROPHENOL
(1	4-CHLORO-3-METHYLPHENOL		TETRACHLOROPHENOL ++
	•		** REPORTED AS 2.3.4.6-TETRACHI OROPHENOL

#### BASE/NEUTRAL EXTRACTABLES METHOD 625

ANOUNT ME/KS	PARAMETER	AMOUNT HE/KE	
:3323233:			*********************
(1	BIS(2-CHLOROETHYL) ETHER	(1	ACENAPHTHENE
(1	1,3-0ICHLGROBENZENE	<b>(1</b>	2,4-DINITROTOLUENE
(1	1,4-01CHLOROBENTENE	(1	FLUGRENE
(1	1,2-0ICHLOROBENZENE	(1	DIETHYLPHTHALATE
(1	HEXACHLOROETHANE	(1	N-NITROSODIPHENYLAMINE
(1	N-NITROSO-DI-N-PROPYLAMINE	(1	4-BROMOPHENYL PHENYL ETHER
(1	NITROBENZENE	(1	HEXACHLOROBENZENE
(1	ISOPHORONE	(1	PHENANTHRENE
(1	BIS(2-CHLOROETHOXY) METHANE	1 (1	ANTHRACENE
⟨1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
⟨1	NAPHTHALENE	(1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	⟨1	PYRENE
⟨1	HEXACHLOROCYCLOPENTAD IENE	(1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	(1	BENZ (A) ANTHRACENE
(1	ЭКЭЈУНТНЧАКЭЗА	(1	CHRYSENE
(1	DINETHYLPHTHALATE	(1	3,3'-OICHLROBENZIDINE
(1	2.6-DINITROTOLUENE	(1	BIS(2-ETHYLHEXYL) PHTHALATE
•••	<b>-</b>	(1	BENZ (A) PYRENE

LAB 8: 84-1825

ITEM #: . 12 SAMPLE: Z1864

> PESTICIDES METHOD 625 EITRACTED BY RCRA 3548

MS/KS

ALPHA-BHC (5

- ⟨5 HEPTACHLOR
- ALDRIN
- **<5** HEPTACHLOR EPOXIDE
- ENDOSULFAN I
- TRANS-NONACHLOR ⟨5
- P, P' -0DE
- (5 DIELDRIN
- (5 ENDRIN
- ENDOSULFAN II ⟨5
- P,P'-000 (5
- ENDOSULFAN CYCLIC SULFATE ⟨5
- P,P'-00T
- SAMMA-BHC (LINDAME)

8/1

Ø2 JAN 85

GC/MS SCAN ID

84-1020 Z1004

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

ITEN 4: SAMPLE: Z1828

PCB'S METHOD 688

************************************						
AMOUNT	PARAM	ETER				
KG/KG	•					•
22394222	1222222222	223223	*******	13322	445444	********
<b>(6.5</b>	PCR GROUP	1				• • •
₹5.1	PCB SROUP	2				
<0.05	PCB GROUP	3				
<b>(8.65</b>	PC8 GROUP	4				
(8.85	PCB GROUP	5				
•	TOTAL PCB					

PCB GROUP 1 INCLUGES PCB 1221 AND IS CALCULATED AS 1221. PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232. PCB GROUP 3 INCLUDES PCB'S 1#16, 1242, AND 1248 AND IS CALCULATED AS 1242. PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254. PCB GROUP 5 INCLUDES PCB'S 126# AND 1262 AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

LAB 8: 84-1929

ITEN 4: 2 SAMPLE: 21807



PCB'S METHOD 688

# <b>#########</b> ##########################					
ANCUNT	PARAMETER				
MG/KE					
*******	######################################	************			

(6.25 PCB GROUP 1 (6.1 PCB GROUP 2 (6.85 PCB GROUP 3 (6.85 PCB GROUP 4 (6.85 PCB GROUP 5 6 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262
AND IS CALCULATED AS 1266.

DATE: 14 JAN 85

LAB 4: 84-1929

ITEN 4: 3 SAMPLE: Z1819



PCB'S METHOD 488

PARAM	ETER
122222222	********************
PCB EROUP	ı
PCB GROUP	2
PCB EROUP	3
PC8 GROUP	4
PCB GROUP	5
TOTAL PCB	•
	PCB GROUP PCB GROUP PCB GROUP PCB GROUP PCB GROUP

PCB GROUP 1 INCLUDES PCB 1221 AND IS

CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS

CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242,

AND 1248 AND IS CALCULATED AS

1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS

CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1269 AND 1262

AND IS CALCULATED AS 1269.

DATE: 14 JAN 85

LAS 4: 84-1828

LTEH 4:

SAMPLE: Z1968



PCB'S

ANGUNT NG/KG	Parame		
⟨€.25	PCB SROUP	1	
⟨€.1	PCB GROUP	2	
<b>(8.45</b>	PCB GROUP	3	
(8.85	PCB GROUP	4	
(8.85	PCB GROUP	•	
1	TOTAL PCB	•	

PCB GROUP I INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1616, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1266 AND 1262
AND IS CALCULATED AS 1266.

42/49

DATE: 14 JAN 85

LAS 4: 84-1928 ITEN 4: 5

SAMPLE: Z1989

PCB'S METHOD 688

******	*********	*************************
ANOUNT	PARAME	ETER
NG/KB		
*******	**********	**********************
(9.25	PCB GROUP	1
⟨€.1	PCB GROUP	2
(6.65	PCB SROUP	3
⟨1.45	PCB GROUP	4
(6.65	PCB GROUP	5
•	TOTAL PCB	

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1916, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262
AND IS CALCULATED AS 1268.

DATE: 14 JAN 85

LAB 6: 84-1828

ITEN #: 6 SAMPLE: Z1916

> PCB'S METHOD 688

ANOUNT PARAMETER
MG/KB

<6.25 PCB SROUP 1</li>
 <6.1 PCB GROUP 2</li>
 .89 PCB GROUP 3
 <6.65 PCB GROUP 4</li>
 <6.65 PCB GROUP 5</li>
 .89 TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS

CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS

CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,

AND 1248 AND IS CALCULATED AS

1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS

CALCULATED AS 1234.

PCB GROUP 5 INCLUDES PCB'S 1266 AND 1262

AND IS CALCULATED AS 1256.

DATE: 14 JAN 85

LAR 8: 84-1926

ITEN 4: 7 SAMPLE: Zigii

> PCB'S METHOD 648

ANOUNT PARAMETER

HG/KS

(8.25 PCB GROUP 1

(8.1 PCB GROUP 2

(8.85 PCB GROUP 3

(8.65 PCB GROUP 4

(8.85 PCB GROUP 5

B TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 3 INCLUDES PCB'S 1260 AND 1262
AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

LAB #: 84-192# ITEN #: 8

SAMPLE: ZIEIZ

PCB'S METHOD 648

AMOUNT PARAMETER

MG/KG

CS.75 PCB GROUP 1

CS.25 PCB GROUP 2

CS.15 PCB GROUP 3

CS.15 PCB GROUP 4

CS.15 PCB GROUP 5

S TOTAL PCB

PCB GROUP I INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCR GROUP 5 INCLUDES PCB'S 1266 AND 1262
AND IS CALCULATED AS 1266.

# LEGA!

DATE: 14 JAN 85

LAS 4: 84-1825 [TEN 4: 9

SAMPLE: ZISI8

PC8'S

AMOUNT PARAMETER

HG/KG

(18 PCB GROUP 1

(16 PCB GROUP 2

(5 PCB GROUP 3

(5 PCB GROUP 4

(5 PCB GROUP 5

### TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1816, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1266 AND 1262
AND IS CALCULATED AS 1266.

47/49

DATE: 14 JAN 85

LAB 4: 84-1929 ITEM 4: 16 SAMPLE: Z1017



PCB'S METHOD 688

22022200	<del>                                      </del>	1722 BUS
ANOUNT NG/KG	PARAMETER	
	•	
<1 <b>55</b>	PCE GROUP 1	
(199	PCB GROUP 2	
₹5₽	PCB GROUP 3	
₹50	PCB GROUP 4	
(50	PCB GROUP 5	
4	TOTAL PCB	•
•	12116 144	

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1234 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262
AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

LAB 4: 84-1926 ITEM 4: 11 SAMPLE: Z1616



PCB'S METHOD AAR

AMOUNT MG/KS	PARAMETER	R	
(8.25	PCB GROUP 1		
⟨∅.1	PCB GROUP 2		
(8.65	PCB GROUP 3		
<b>(5.65</b>	PCB GROUP 4		
(8.65	PCB GROUP 5		
•	TOTAL PCB		

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,
AND 1246 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1266 AND 1262
AND IS CALCULATED AS 1266.

DATE: 14 JAM 85

LAS 8: 84-1929 ITEM 9: 12 SAMPLE: 11884



PCB'S METHOD 668

ANOUNT MG/KG	PARAMETER		
(1.5	PCB GROUP 1		
(1.1	PCB GROUP 2		
(1.05	PCB GROUP 3		
<0.05	PCB GROUP 4		
(1.15	PCB GROUP 5		
•	TOTAL PCB		

PCB GROUP 1 INCLUDES PCB 1221 AND IS
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1815, 1242,
AND 1248 AND IS CALCULATED AS
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1268 AND 1262
AND IS CALCULATED AS 1268.

#### COFFEY LABORATORIES, INC.

4914 N.E. 122ND AVE. PORTLAND, OREGON 97230 (503) 254-1794 RECEIVED

JUL 1 9 1985

Foot of North Portsmouth

July 17, 1985

Log #A850701-E

Riedel Environmental Services F. O. Box 3320 Fortland, Oregon 97023 Attention: John Ruddick

Analyses Requested: Pentachlorophenol

RAMPLE ID	RESULTS
A-west Frimary Lateral	550 mg/kg
D-South Primary Lateral	860 mg/kg
G-East Primary Lateral	17 mg/kg

Sincerely,

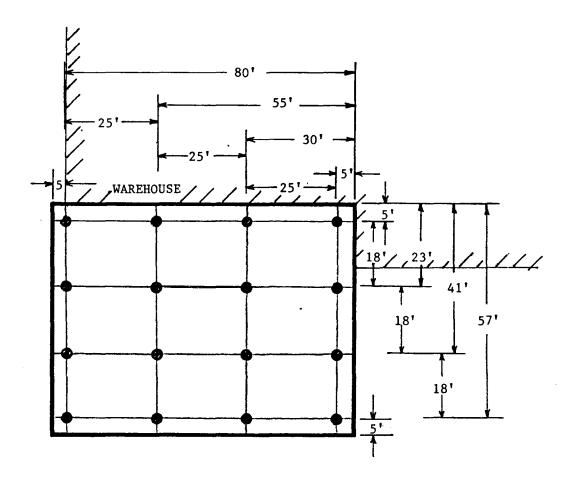
Susan Mi, Coffey

President

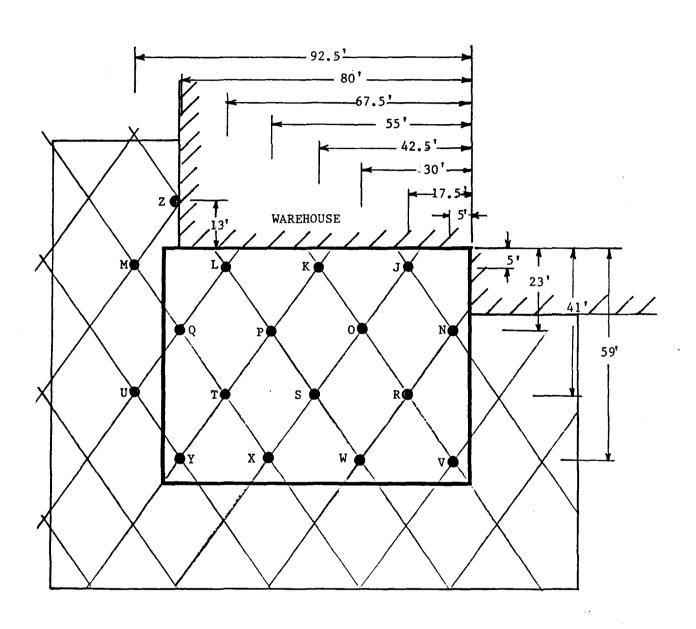
SMC/05

#### SPLIT SPOON SAMPLING PLAN

RECTANGULAR MATRIX
(Maximum Distance = 15.49)



## SPLIT SPOON SAMPLING PLAN TRIANGULAR MATRIX (Maximum Distance = 13.34')



### DEPTH OF SURFACE BELOW GRADE (HORIZONTAL STRING LINE)

BORING	DEPTH
J	0
K	-5 "
Ĺ	-3'1"
M	0
N	0
0	0
P	-1'8"
Q	-2'6"
R	0
S	0
T	-1'11"
U	0
V	0
W	0
X	-1'11"
Υ	-3'1"
Z	0

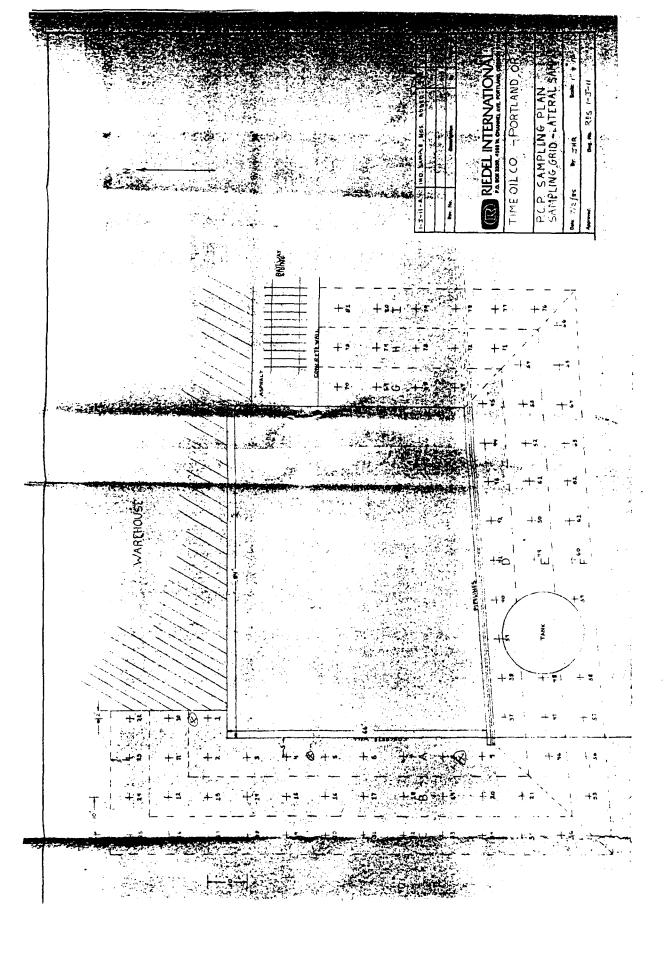
#### ACTUAL SPOON DEPTHS BELOW GRADE

BORING	0	2	DEPTHS IN FEET	77	12
J	0	0-2	2-4	5-7	10-12
к	N/A	0-1.5	1.5-3.5	4.5-6.5	9.5-11.5
L	N/A	N/A	SURFACE SAMPLE	2-4	7-9
м	0	0-2	2-4	5-7	10-12
N	0	0-2	2-4	5-7	10-12
o	0	0-2	2-4	5-7	10-12
P	N/A	SURFACE SAMPLE 4" DOWN	0-2	3-5	8-10
Q	N/A	N/A	0-1.5	2.5-4.5	7.5-9.5
R	0	0-2	2-4	5-7	10-12
s	0	0-2	2-4	5-7	10-12
т	N/A	SURFACE SAMPLE	0-2	3-5	8-10
U	0	0-2	2-4	5-7	10-12
v	0	0-2	2-4	5-7	10-12
W	0	0-2	2-4	5-7	10-12
x	N/A	SURFACE SAMPLE	0-2	3-5	8-10
Y	N/A	· N/A	SURFACE SAMPLE	2-4	7-9
Z	0	0-2	2-4	5-7	10-12

#### MAXIMUM NUMBER OF SAMPLES

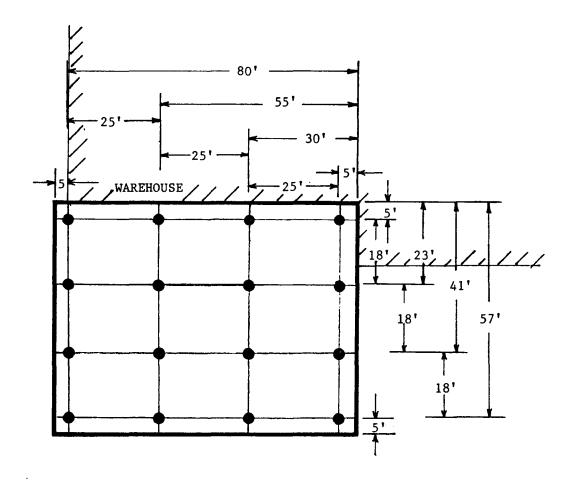
3.350

		DE	PTHS IN FEE	T		
BORING	O (SURFACE)	2 (0-3)	4 (2-4)	7 (5-7)	12 (10-12)	SAMPLES PER HOLE
	(SURFACE)	(0-2)	(2-4)	(2-1)	•	
3	Х	X	X	X	X	5
K	-	x	X	х	X	4
L	_	-	χ .	x	x	3
M	x	Х	X	X	X	5
N	х	Х	X	X	X	5
. 0	x	χ	X	X	X	5
Р	_	X	X	x	x	4
Q	_	-	X	X	X	3
R	x	х	X	X	x	5
S	x	X	X	X	X	5
T	_	X	X	X	x	4
U	x	X	X	X	x	5
V	x	x	X	x	X	5
W	x	x	X	X	x	5
X	_	x	Х	х	x	4
Y	-	-	X	х	X	3
2	х	Х	X	X	X	5
SAMPLES BY DEPTH	10	14	17	17	17	75

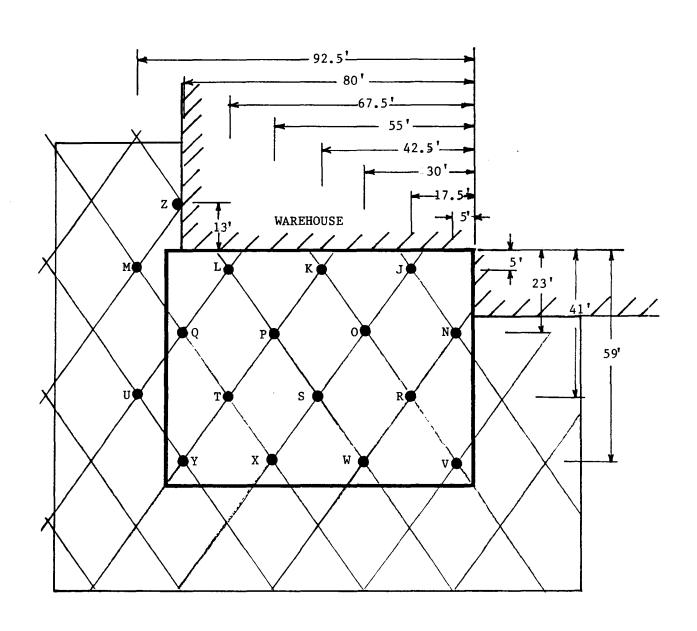


#### SPLIT SPOON SAMPLING PLAN

RECTANGULAR MATRIX (Maximum Distance = 15.49')



## SPLIT SPOON SAMPLING PLAN TRIANGULAR MATRIX (Maximum Distance = 13.34')



### DEPTH OF SURFACE BELOW GRADE (HORIZONTAL STRING LINE)

BORING	<u>DEPTH</u>
J	0
K	-5 <sup>11</sup>
L	-3'1"
M	0
N	0
0	0
P	-1'8"
Q	-2 <sup>1</sup> 6 <sup>n</sup>
R	0
S	0
T	-1'11"
U	0
٧	0
W	0
X	-1'11"
Y	-3'1"
Z	0

#### ACTUAL SPOON DEPTHS BELOW GRADE

BORING	0	2	DEPTHS IN FEET	7	12
J	0	0-2	2-4	5–7	10-12
K	N/A	0-1.5	1.5-3.5	4.5-6.5	9.5-11.5
L	N/A	N/A	SURFACE SAMPLE	2-4	7-9
м	0	0-2	2-4	5-7	10-12
N	0	0-2	2-4	5–7	10-12
0	0	0-2	2-4	5–7	10-12
Р	N/A	SURFACE SAMPLE 4" DOWN	0-2	3-5	8-10
Q	N/A	N/A	0-1.5	2.5-4.5	7.5-9.5
R	0	0-2	2-4	5-7	10-12
S	0	0-2	2-4	5-7	10-12
Τ	N/A	SURFACE SAMPLE	0-2	3-5	8-10
U	0	0-2	2-4	5-7	10-12
V	0	0-2	2-4	5-7	10-12
W	0	0-2	2-4	5-7	10-12
X	N/A	SURFACE SAMPLE	0-2	3-5	8-10
Y	N/A	N/A	SURFACE SAMPLE	2-4	7-9
Z	0	0-2	2-4	5-7	10-12

# MAXIMUM NUMBER OF SAMPLES

	•	nei	THS IN FEE	т.		
BORING	0 (SURFACE)	2 (0-2)	4	7 (5-7)	12 (10-12)	SAMPLES PER HOLE
J	х	Х	X	x	x	5
; • <b>K</b>	-	X	X	x	X	4
ر ا	_	_	X	x	x	3
`M	\[ \text{x}	x	X	X	x	5
Ŋ	x	x	x	x	X	5
0	×	x	X	x	x	5
P	-	x	X	X	x	4
Q	_	-	X	x	x	3
R	х	x	X	x	x	5
S	×	X	X	x	х -	5
T	-	X	X	x	x	4
U	х	X	X	X	X	5
V	х	X	X	x	X	5
W	х	x	X	x	X	5
X	-	X	X	X	X	4
Y	-	-	X	x	X	3
_ Z	x	X	X	X	x	5
SAMPLES BY DEPTH	10	14	17	17	17	75

# **Century Environmental Sciences**

June 4, 1986

Mr. John Denham Time Oil Company 2737 W. Commodore Way Seattle, Washington 98199

# Dear Mr. Denham:

Century Environmental Sciences (Century) is pleased to transmit herein to Time Oil Company (Time) the results of chemical analyses performed on groundwater samples obtained from the Portland facility.

# BACKGROUND

In early 1986 Time installed a monitoring well network at this facility. Subsequently, Time retained Century to measure static water levels, purge the wells and obtain groundwater samples using EPA approved sampling protocols, and analyze the samples. The results of this investigation are discussed below.

# FIELD ACTIVITIES

Prior to monitoring well purging and groundwater sampling, Century obtained static water level measurements in the Time monitoring wells. These measurements were performed in accordance with EPA approved procedures.

The following results are identified by the letter designation of the well preceded by either MW (monitoring well) or WP (well point):

# RESULTS

WELL NO.	STATIC WATER LEVEL (FEET BELOW TOP OF CASING)
WP-A	13.65
W P - B	13.70
WP-C	8.90 (Filled with sand to $9.20$ ft.)
WP-E	12.90
WP-F	13.00
WP-G	Dry
MW-4	18.98

-1-

One S.W. Columbia Street Suite 1222 Portland, Oregon 97258 Phone (503) 224-4334

Century Environmental Sciences Century West Engineering Corporation Century Testing Laboratories, Inc. Century West Development Services Portland and Bend, Oregon Spokane and Pasco, Washington Bozeman, Montana

Century Testing Laboratories (CTL) provided Century with appropriately preserved sample containers. Three well volumes of water were removed from each well and well point prior to sampling so that native aquifer groundwater was sampled as opposed to standing well water. In order to purge the wells and well points, a temporary water treatment system was designed to dispose of the purged groundwater. Essentially, this system involved partially filling a 55-gallon drum with 75-pounds of activated charcoal. Activated charcoal has been proven to be very effective in treatment of Penta contaminated groundwater. discharge hose was attached to the bottom of the 55-gallon drum and the pre-treated groundwater was directed to the sanitary sewer. A pump was utilized to purge the four-inch monitoring Groundwater was discharged directly from the pump line into the treatment drum. The remaining wells were either pumped using a small, nitrogen activated sampling pump (for the 2-inch well points), or bailed using a 3/4-inch outside diameter (OD) 39-inch long stainless steel bailer. Groundwater from the smaller pump and bailer was discharged temporarily into a 5gallon bucket and subsequently poured into the treatment barrel. After each well that contained groundwater was purged and the static water level was allowed to recover to near its original level, the samples were obtained. The pumps and bailer were steam cleaned between wells following sampling.

Dates, times and locations of sampling were documented on the sample containers, on a field log form and on the sample chain of custody form. Samples were immediately chilled after they were obtained, packed and shipped to CTL on the last day of sampling. Chain of custody documentation accompanied the samples. The chain of custody form documents each individual who was in possession of the sample from the time they were obtained to the time they arrived in the lab. Chain of custody aids in tracking sample possession and assures that the samples were not tampered with enroute from the field to the lab.

WELL NO.	PENTACHLOROPHENOL CONCENTRATION
	(in ug/l or ppb)
W P - B	2.6
W P - E	<1.0
WP-F	1.4
MW-4	6.1

-2-

Attachment 1 contains the laboratory report for this investigation. Analytical method 8270 described in the EPA publication SW-846 ("Test Methods for Evaluating Solid Waste") was utilized to analyze the Time groundwater samples for penta concentration. This method is equivalent to EPA method 625.

Century appreciates the opportunity to complete this work for Time. If you have any questions or comments regarding the data enclosed herein, please do not hesitate to call me.

Yours truly,

CENTURY ENVIRONMENTAL SCIENCES

Sam Rothermel

Samuel R. Rothemel

Environmental Engineer, Hydrogeologist

SR/js

# ATTACHMENT 1

GROUNDWATER ANALYTICAL RESULTS



MAY 22 1000

May 21, 1986

John Ruddick Century Environmental Sciences One S. W. Columbia, Suite 1222 Portland, OR 97258

Dear John:

Here are the Penta results from Time oil:

CES #	Pentachlorophenol conc.
	ug/1 (ppb)
WP-B	2.6
MW-4"	6.1
WP-E	<1.0
WP-F	1.4

If you have any questions, please phone.

Sincerely,

CENTURY TESTING LABORATORIES, INC.

Walter F. Burns

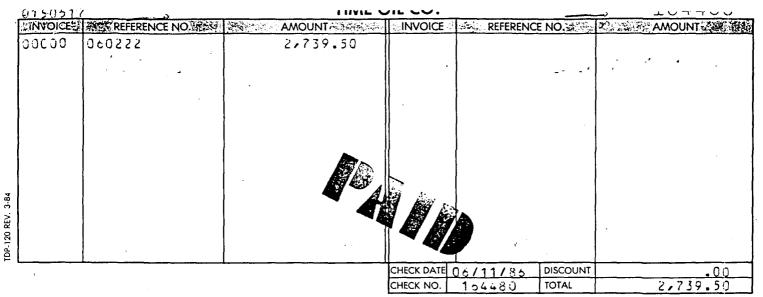
Walter F. Burns

Organic Chemistry Supervisor

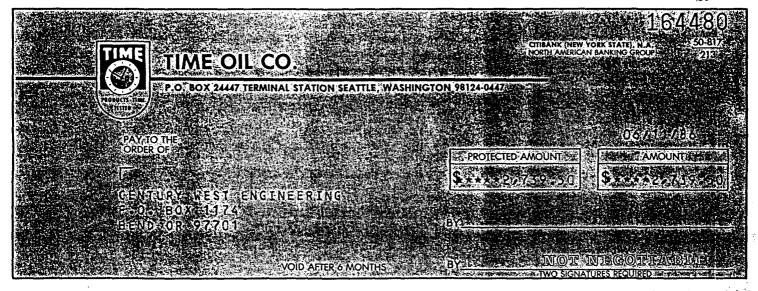
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P.O. BOX 1174 • BEND, OR 97709 • (503) 382~6432 Water • Feed • Soils • Construction Materials • General Analytical Services.

Property No.: 03-12	Name and Addi	ess: <u>/</u>	VW Termina				
Sampler: Fred Pro	oby	4	2005 N F	34190	٠ حل		
Date and Time: $5/9/3$	1 86 1300		Portland 0	R			
ITEM SAMPLE NUMBER	DESCRIPTION	ITEM	SAMPLE NUMBER	DES	CRIPTION		
1 03-123-4A W	ell #1 water	11					
	ell #11 Water (duplicate	) 12					
3		13					
4		14					
5		15					
6		16					
7		17			·		
8		18					
9		19					
10		20					
Laboratory Name and Addr	ress: (c/o Contury En	ir. Sc.	ا Phone N	0.:_(	)		
-7- ( P- de	CHAIN OF CU	1			doluce on a		
mux vno	70C-	- NW	Terminal son		5/9/86 133,0		
Relinquished E	<sup>B</sup> Y	R	eceived By		Date & Time		
Relinquished E	ЗУ	R	eceived By		Date & Time		
Relinquished E	Rec	eived	for Laboratory B	<del>y</del> -	Date & Time		
TO BE FILLED OUT BY LABO	TO BE FILLED OUT BY LABORATORY: Sample ID Numbers:						
Person Performing Analys	is:		Analysi	s Date:			
Methods Used:					<del></del>		
Final Disposition of Sam	ples:	<del></del> .					
IMPORTANT: Return original completed Sample Log and analysis results to Time Oil Co. 2737 W. Commodore Way, Seattle, WA 98199 Attention: John P. Denham, Environmental Manager (206)285-2400							



WHEN DETACHED AND PAID, THIS CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE ITEMIZED ACCOUNT





April 30, 1986 Dona the colonial factor

# INVOICE FOR PROFESSIONAL SERVICES

CENTURY ENVIRONMENTAL SCIENCES

Time Oil Co. **AP.O.** Box 24447 2737 W Commadore Way Seattle WA 98124-0447

Marie Marie College College

The last is warm a with the think when the second ATTN: John Denham

RE:

Project No.: 6002400101

Well Sampling and analysis

INVOICE BILLING AMOUNTS:

Work Completed for April 1986

Professional Services

TOTAL AMOUNT DUE THIS INVOICE

Was Anomia BILLING SUMMARY

> March April

\$130.50 \$2739.50

TOTAL DUE

\$2870.00

DIST **ATTACHED** 

JUN 1 1 RECD

PLANNERS • ENGINEERS • ECONOMISTS • SCIENTISTS

POST OFFICE BOX 1174 • BEND, OREGON 97701 • TELEPHONE (503) 388-3500

Original for your records. Please return duplicate with remittance.

		PUF	CHASE ORDER
TIME OIL C P.O. BOX 24447 • TERMINAL A			
2737 WEST COMMODORE WAY • SEATTLE, WASHINGTON (206) 285-2400	NGTON 98124-0447	14 6 45	61750
To Centity Environmental Sciences		YO	UR INVOICE AND ALL CORRESPONDENCE
One Stw. Columbia, Suite 1222		ch 24, 1986	
Portland OR 97258			SHIP AY
	DESCRIPTION		E UNIT PRICE AMOUNT
Develop and sample			
well points and si			\$50.00 T
			-A (Caraba)
Provide written su			
locations and resu			
	Cost not to	exceed	\$2,870.00
			46
FOR RESALE TAXABLE TAXABLE WASHINGTON STATE DESALE CERTIFICATE #C178-47576	<u> </u>	TIME O	IL CO.
WASHINGTON STATE RESALE CERTIFICATE #C178-47526	BY	# [] 'M	my _
THIS PURCHASE IS EXPENSE OF: T.O.C. OTHER	EX PLANATION	DATE WANTED	
F. SERVICE STATION (SHOW ADDRESS AND OPERATOR)	For North	<del>rest terminal (</del> K	oppers)
T. 0. C.			
ACCURATION DEPOSITED BY		APPROVED BY	
	FILE COPY	_( <u>)</u>	

# **Century Environmental Sciences**

July 7 , 1986

Mr. John Denham Time Oil Company 2737 W. Commodore Way Seattle, Washington 98199

Dear John:

Attached is a copy of the report of field sampling and analytical results for groundwater samples taken at the north Portland terminal. The only detectable concentrations of pentachlorophenol in groundwater was at Well "I" located to the west of the warehouse building. The pH of the groundwater at this site was 5.74.

According to comments made in the Tuesday, March 11, 1986, Federal Register, Volume 51, No. 47, Page 8361, the EPA has proposed water quality criteria for pentachlorophenol. The criteria for fresh water aquatic life for pentachlorophenol indicates that the four day average concentration in parts per billion of pentachlorophenol which should not unacceptably affect fresh water aquatic organisms and their uses, may be calculated by an equation based on the pH of the groundwater. A second equation is given to determine the no-effect concentrations for one hour average values as well.

Based on these equations, the four day average concentration at pH 5.74 is 1.49 parts per billion. The one hour average concentration limit is 2.36 parts per billion. On this basis, the detected concentration in Well "I" is below the one hour average concentration limit cited above. The one hour concentration limit rather than the four day average limit is appropriate since this Well "I" value of 2.2 ppb is a single sample result.

I hope the information provided in this report is helpful to you. Should you have any comments or questions, please don't hesitate to contact me.

Sincerely,

**W**istsupped 30

CENTURY ENVIRONMENTAL SCIENCES

John Ruddyck

Manager/Senior Scientist

**Enclosure** 

One S.W. Columbia Street Suite 1222 Portland, Oregon 97258 Phone (503) 224-4334

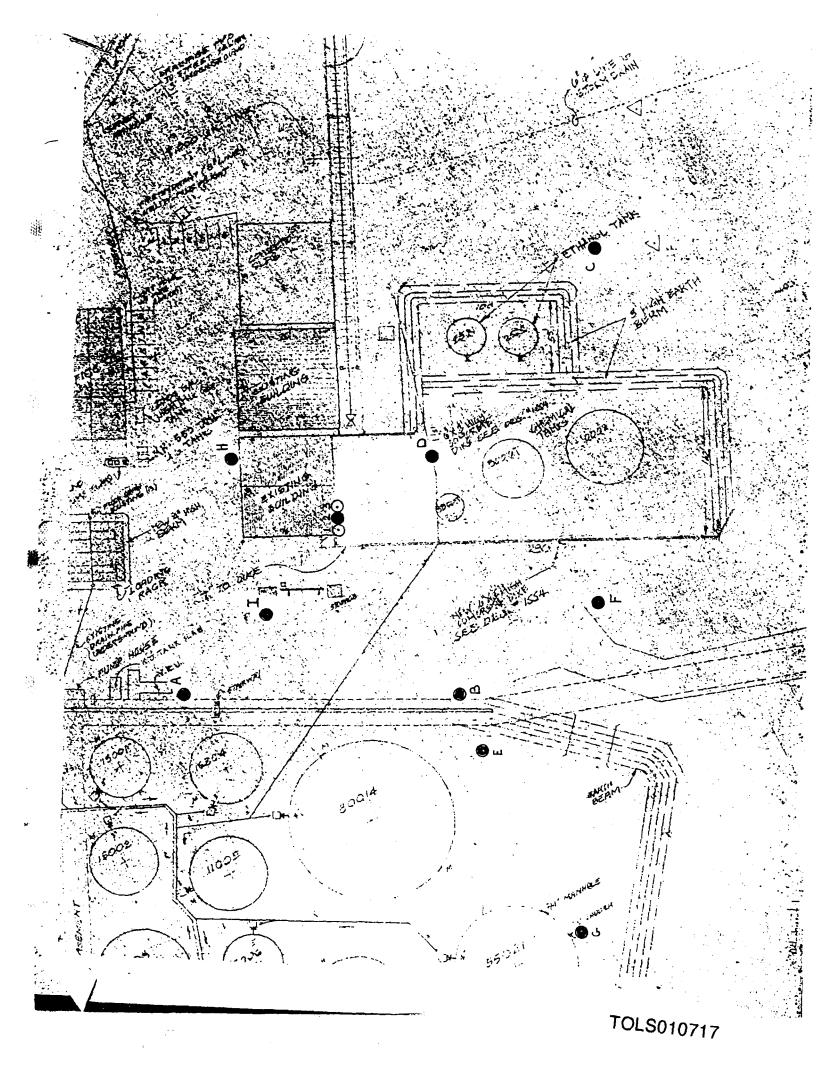
Century Environmental Sciences Century West Engineering Corporation Century Testing Laboratories, Inc. Century West Development Services Portland and Bend, Oregon Spokane and Pasco, Washington Bozeman, Montana



Sampling procedures meet EPA Pub. SW846. Time Oil groundwater samples were analyzed by GC/MS using EPA Method. The submitted sample from well No. 4 contained an insufficient amount of material for analysis.

WELL NO.	STATIC WATER LEVEL (FEET) (5-28-86)	FIELD Ph	PENTACHLOROPHENOL mg/L (ppm) (1)	STATIC WATER LEVEL (6-5-86)	
A	13.17	6.56	N.D.	12.15	
В	13.16	6.29	N.D.	13.18	
<b>D</b> • • • • • • • • • • • • • • • • • • •	12.52	6.49	N.D.	12.65	
. <b>E</b>	13.65	7.70	N.D.	13.75	
F	13.90	6.73	N.D.	13.93	.24
Н	9.31	6.32	N.D.	9.46	ş.i
ī	12.89	5.74	.0022	13.02	
QA/QC (Du	plicate B)		N.D.		
Field Bla	nk		N.D.		
2	15.00			15.11	
River	18.52			14.54	

NOTE: (1) Samples collected on May 28, 1986; Laboratory analysis reported on June 9, 1986. Detection Limit of 002 ppm.



# Regulatory Flexibility Analysis

33.

Pursuant to the Regulatory Flexibility Act of 1980 (5 U.S.C. 601, et seq.) each agency, when required by 5 U.S.C. 553 to publish a proposed rule, is further required to prepare and make available for public comment an initial regulatory flexibility analysis to describe the impact of the proposed rule on small entities. In this instance, the proposal relates to nonregulatory services provided by Western. Under 5 U.S.C. 601(2), a proposal with particular applicability is not considered "a rule" within the meaning the Act. Since this proposal is of limited applicability and is being set in accordance with specific regulations and legislation under particular circumstances, Western believes that no flexibility analysis is required.

# Determination Under Executive Order 12291

The Department of Energy has determined that this is not a major rule because it does not meet the criteria of section 1(b) of Executive Order 12291, 46 FR 13193 (February 19, 1981). Western has an exemption from sections 3, 4, and 7 of Executive Order 12291.

Issued at Golden, Colorado, February 24, 1986.

William H. Clagett,

Administrator.

[FR Doc. 86-4717 Filed 3-10-86; 8:45 am] BILLING CODE 6450-01-M

# ENVIRONMENTAL PROTECTION AGENCY

[OW-FRL-2981-8]

# **Management Advisory Group Meeting**

Under Pub. L. 92–463, notice is hereby given that a one and a half day meeting of the Management Advisory Group to the EPA Construction Grant Program (MAG) will be held on March 26–27, 1986, in Washington, DC, at EPA Headquarters, 401 M Street SW., Washington, DC 20460. The meeting room will be Conference Room 2, at the EPA Washington Information Center located on the ground floor of the Waterside Mall area. The time of the meeting will be 9 a.m. to 5 p.m. on March 26, and 8 a.m. to 1 p.m. on March 27.

The principal agenda item will be work on a MAG report on compliance and operation and maintenance of publicly owned wastewater treatment works, specifically on recommendations to be made by MAG. The agenda will also include briefings and discussions on other topics of current or future

interest to MAG. Any member of the public wishing to make comments is invited to submit them in writing to the Executive Secretary at the meeting.

The meeting will be open to the public. For additional information, contact Georgette Brown at (202) 382–5859.

Dated: March 5, 1986.
Edwin L. Johnson,
Assistant Administrator for Water.
[FR Doc. 86-5243 Filed 3-10-86; 8:45 am]
BILLING CODE 6560-50-M

# [OW-FRL-2981-4]

### Water Quality Critoria; Ambient Aquatic Life Water Quality Criteria Documents

**AGENCY:** Environmental Protection Agency.

**ACTION:** Notice of request for comments on ambient aquatic life water quality criteria documents.

summary: EPA announces the availability for public comment, and provides summaries of four ambient aquatic life water quality criteria documents. When published in final form after the review of public comments, these water quality criteria may form the basis for enforceable standards. These criteria are published pursuant to section 304(a)(1) of the Clean Water Act.

**DATE:** Written comments should be submitted to the person listed directly below by May 12, 1986.

# FOR FURTHER INFORMATION CONTACT: Dr. Frank Gostomski, Criteria and Standards Division (WH-585), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460. (202) 245-3030.

# Availability of Documents

This notice contains summaries of four documents containing proposed ambient water quality criteria for the protection of aquatic life and its uses. Copies of the complete criteria documents may be obtained upon request from the person listed above. These documents are also available for public inspection and copying during normal business hours at: Public Information Reference Unit, U.S. Environmental Protection Agency, Room 2404 (rear), 401 M St., SW., Washington, DC 20460. As provided in 40 CFR Part 2, a reasonable fee may be charged for copying services. Copies of these documents are also available for review in the EPA Regional Office libraries. A list of the proposed documents is presented below:

- Ambient Water Quality Criteria for Aluminum.
- 2. Ambient Water Quality Criteria for Chlorpyrifos.
- 3. Ambient Water Quality Criteria for Nickel.
- 4. Ambient Water Quality Criteria for Pentachlorophenol.

### SUPPLEMENTARY INFORMATION:

### Background

Section 304(a)(1) of the Clean Water Act (33 U.S.C. 1314(a)(1)) requires EPA to publish and periodically update ambient water quality criteria. These criteria are to reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation.

EPA has periodically issued ambient water quality criteria beginning in 1973 with the publication of the "Blue Book" (Water Quality Criteria 1972). In 1976, the "Red Book" (Quality Criteria for Water) was published. On November 28, 1980 (45 FR 79318), EPA announced the publication of 64 individual ambient water quality criteria documents for pollutants listed as toxic under section 307(a)(1) of the Clean Water Act. A document addressing 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) was announced on February 15, 1984 (FR 49 5831) completing the coverage of the 65 priority pollutants listed in 307(a)(1). Nine ambient water quality documents, including revision of seven of the 1980 documents, were released on July 29, 1985 (50 FR 30784).

Today EPA is announcing the availability for comment four proposed individual ambient aquatic life water quality criteria documents. Two of the documents, nickel and pentachlorophenol, upon final publication, will update and revise appropriate sections of the 1980 criteria documents. The other two, aluminum and chlorpyrifos, will address chemicals which have not been covered before.

The documents announced today will not contain information on the effects of these pollutants on human health. EPA anticipates the release of water quality advisories on aluminum and chlorpyrifos to specifically address human health concerns. Advisories will also be issued to update the human health section of the 1980 ambient water quality criteria documents for nickel and pentachlorophenol if a review of the available information indicate that such a revision is necessary. Both the criteria documents announced today and the water quality advisories addressing human health may form the basis for enforceable standards, when published in final form.

Dated: February 19, 1986. Edwin L. Johnson,

Acting Assistant Administrator for Water.

# Summary of Proposed Water Quality Criteria

### 1. Aluminum

50

Freshwater Aquatic Life. Freshwater organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, when the pH is between 6.5 and 9.0, if the four-day average concentration of aluminum does not exceed 150 µg/L more than once every three years on the average and if the one-hour average concentration does not exceed 950 µg/L more than once every three years on the average. EPA recommends applying the criteria for metals using the total recoverable method until a protocol for the measurement of "acid-soluble" metals is approved.

The allowed average excursion frequency of three years is the Agency's best scientific judgment of the amount of time it will take an unstressed system to recover from a pollution event in which exposure to these pollutants exceeds the criteria. Stressed systems, for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilienca of ecosystems and their ability to recover differ greatly, however, and site-specific excursion frequencies may be established if adequate justification is provided.

Use of criteria for developing water quality-based permit limits and for designing waste treatment facilities requires selection of an appropriate wasteload allocation model. Dynamic models are preferred for the application of these criteria. Limited data or other considerations might make their use impractical, in which case one must rely on a steady-state model. The Agency recommends the interim use of 1Q5 or 1Q10 for the Criterion Maximum Concentration (CMC) design flow and 7Q5 or 7Q10 for the Criterion Continuous Concentration (CCC) design flow in steady-state model for unstressed and stressed systems respectively. These matters are discussed in more detail in the Technical Support Document for Water Quality-Based Toxics Control (U.S. EPA,

Saltwater Aquatic Life. EPA feels there is no significant need for a saltwater criterion for aluminum.

# 2. Chlorpyrifos

Freshwater Aquatic Life. Freshwater aquatic organisms and their uses should

not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration of chlorpyrifos does not exceed  $0.033~\mu g/L$  more than once every three years on the average and if the one-hour average concentration does not exceed  $0.083~\mu g/L$  more than once every three years on the average.

The allowed average excursion frequency of three years is the Agency's best scientific judgment of the amount of time it will take an unstressed system to recover from a pollution event in which exposure to these pollutants exceeds the criteria. Stressed systems, for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilience of ecosystems and their ability to recover differ greatly, however, and site-specific excursion frequencies may be established if adequate justification is provided.

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Saltwater Aquatic Life. Saltwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a local important species is very sensitive, if the four-day average concentration of chlorpyrifos does not exceed 0.0015 µg/L more than once every three years on the average, and if the one-hour average concentration does not exceed 0.0038 µg/L more than once every three years on the average.

The allowed average excursion frequency of three years is the Agency's best scientific judgement of the amount of time it will take an unstressed system to recover from a pollution even in which exposure to these pollutants exceeds the criteria. Stressed systems, for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilience of ecosystems

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## 3. Nickel

Freshwater Aquatic Life. Freshwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration (in  $\mu g/L$ ) of nickel does not exceed the numerical value given by (0.8460[1n(hardness)]+ 1.1645) more than once every three years on the average, and if the one-hour average concentration (in µg/L) does not exceed the numerical value given by e(0.8460[1n (hardness)]+3.3612) more than once every three years on the average. For example, at hardnesses of 50, 100 and 200 mg/L as CaCO<sub>3</sub> the fourday average concentrations of nickel are 88, 160 and 280  $\mu$ g/L, respectively, and the one-hour average concentrations are 790, 1400 and 2500 μg/L. EPA recommends applying the criteria for metals using the total recoverable method until a protocol for the measurement of "acid-soluble" metals is approved.

The allowed average excursion frequency of three years is the Agency's best scientific judgement of the amount of time it will take an unstressed system to recover from a pollution event in which exposure to these pollutants exceeds the criteria. Stressed systems, for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilience of ecosystems and their ability to recover differ greatly, however, and site-specific excursion frequencies may be

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Saltwater Aquatic Life. Saltwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration of nickel does not exceed 7.9 µg/L more than once every three years on the average, and if the one-hour average concentration of nickel does not exceed 71 µg/L more than once every three years on the average.

EPA recommends applying the criteria for metals using the total recoverable method until a protocol for the measurement of "acid-soluble" metals is approved.

The allowed average excursion frequency of three years is the Agency's best scientific judgement of the amount of time it will take an unstressed system to recover from a pollution event in which exposure to these pollutants exceeds the criteria. Stressed systems, for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilience of ecosystems and their ability to recover differ greatly, however, and site-specific excursion frequencies may be established if adequate justification is provided.

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# 4. Pentachlorophenol

Freshwater Aquatic Life. Freshwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration (in µg/L) of pentachlorophenol does not exceed the numerical value given by (1.005[pH] -5 .368) more than once every three years on the average, and if the one-hour average concentration (in µg/L) does not exceed the numerical value given by  $_{\circ}$ (1.005[pH] -4.908) more than once every three years on the average. For example, at pH = 6.5, 7.8, and 9.0, the four-day average concentrations of pentachlorophenol are 3.2, 12 and 40 µg/ L. respectively, and the one-hour average concentrations are 5.1, 19 and 63 µg/L.

The allowed average excursion frequency of three years is the Agency's best scientific judgement of the amount of time it will take an unstressed system to recover from a pollution event in which exposure to these pollutants exceeds the criteria. Stressed systems. for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilience of ecosystems and their ability to recover differ greatly, however, and site-specific excursion frequencies may be established if adequate justification is provided.

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Concentration (CMC) design flow and 7Q5 or 7Q10 for the Criterion Continuous Concentration (CCC) design flow in steady-state model for unstressed and stressed systems respectively. These matters are discussed in more detail in the Technical Support Document for Water Quality-Based Toxics Control (U.S. EPA, 1985).

Saltwater Aquatic Life. Saltwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration of pentachlorophenol does not exceed 8.1 µg/L more than once every three years on the average, and if the one-hour average concentration does not exceed 13 µg/L more than once every three years on the average.

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[FR Doc. 86-5161 Filed 3-10-86; 8:45 am]
BILLING CODE 6560-50-M

# TIME OIL CO. SUMMARY OF FIELD AND ANALYTICAL RESULTS GROUNDWATER SAMPLING AND ANALYSIS

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Sampling procedures meet EPA Pub. SW846.
Time Oil groundwater samples were analyzed by GC/MS using EPA Method.
The submitted sample from well No. 4 contained an insufficient amount of material for analysis.

Ref Bleu	WELL NO.	STATIC WATER LEVEL (FEET) (5-28-86)	FIELD Ph	PENTACHLOROPHENOL mg/L (ppm) (1)	STATIC WATER LEVEL (6-5-86)	WT Elev
97.14	A 83.97	13.17	6.56	N.D.	12.15	84.99
26,83	в 83.67	13.16	6.29	N.D.	13.18	83.65
97.93	D 85.41	12.52	6.49	N.D.	12.65	85.28
97.83	E 87.18	13.65	7.70	N.D.	13.75	84.08
77.97	F .84.07	13.90	6.73	N.D.	13.93	84.04
94.75	H 85.44	9.31	6.32	N.D.	9.46	85.29
98.00	I 85.11	12.89	5.74	.0022	13.02	84.98
	QA/QC (Du	plicate B)		N.D.	•	
	Field Blan	nk		N.D.		
	2	15.00			15.11	
96.30	River 77.58	18.52			14.54	81.76

NOTE: (1) Samples collected on May 28, 1986; Laboratory analysis reported on June 9, 1986. Detection Limit of 002 ppm.

interest to MAG. Any member of the public wishing to make comments is invited to submit them in writing to the Executive Secretary at the meeting.

The meeting will be open to the public. For additional information, contact Georgette Brown at (202) 382-5859.

Dated: March 5, 1986.
Edwin L. Johnson,
Assistant Administrator for Water.
[FR Doc. 86–5243 Filed 3–10–86; 8:45 am]
BILLING CODE 6560–50-M

# [OW-FRL-2981-4] Clarge group attached the

Water Quality Criteria; Ambient Aquatic Life Water Quality Criteria Documents

AGENCY: Environmental Protection Agency.

ACTION: Notice of request for comments on ambient aquatic life water quality criteria documents.

availability for public comment, and provides summaries of four ambient aquatic life water quality criteria documents. When published in final form after the review of public comments, these water quality criteria may form the basis for enforceable standards. These criteria are published pursuant to section 304(a)(1) of the Clean Water Act.

DATE: Written comments should be submitted to the person listed directly below by May 12, 1986.

FOR FURTHER INFORMATION CONTACT:
Dr. Frank Gostomski, Criteria and
Standards Division (WH-585), U.S.
Environmental Protection Agency, 401 M
Street, SW., Washington, DC 20460.
(202) 245-3030.

# Availability of Documents

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This notice contains summaries of four documents containing proposed ambient water quality criteria for the protection of aquatic life and its uses. Copies of the complete criteria documents may be obtained upon request from the person listed above. These documents are also available for public inspection and copying during normal business hours at: Public Information Reference Unit, U.S. Environmental Protection Agency, Room 2404 (rear), 401 M St., SW., Washington, DC 20460. As provided in 40 CFR Part 2, a reasonable fee may be charged for copying services. Copies of these documents are also available for review in the EPA Regional Office libraries. A list of the proposed documents is presented below:

- 1. Ambient Water Quality Criteria for Aluminum.
- 2. Ambient Water Quality Criteria for Chlorpyrifos.
- 3. Ambient Water Quality Criteria for Nickel.
- 4. Ambient Water Quality Criteria for Pentachlorophenol.

### SUPPLEMENTARY INFORMATION:

# Background

Section 304(a)(1) of the Clean Water Act (33 U.S.C. 1314(a)(1)) requires EPA to publish and periodically update ambient water quality criteria. These criteria are to reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation.

EPA has periodically issued ambient water quality criteria beginning in 1973 with the publication of the "Blue Book" (Water Quality Criteria 1972). In 1978, the "Red Book" (Quality Criteria for Water) was published. On November 28. 1980 (45 FR 79318), EPA announced the publication of 64 individual ambient water quality criteria documents for pollutants listed as toxic under section 307(a)(1) of the Clean Water Act. A document addressing 2,3,7,8tetrachlorodibenzo-p-dioxin (TCDD) was announced on February 15, 1984 (FR 49 5831) completing the coverage of the 65 priority pollutants listed in 307(a)(1). Nine ambient water quality documents, including revision of seven of the 1980 documents, were released on of the 1980 documents, ... July 29, 1985 (50 FR 30784).

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The documents announced today will not contain information on the effects of these pollutants on human health. EPA anticipates the release of water quality advisories on aluminum and chlorpyrifos to specifically address human health concerns. Advisories will also be issued to update the human health section of the 1980 ambient water quality criteria documents for nickel and pentachlorophenol if a review of the available information indicate that such a revision is necessary. Both the criteria documents announced today and the water quality advisories addressing human health may form the basis for enforceable standards, when published in final form.

Dated: February 19, 1986. Edwin L. Johnson,

Acting Assistant Administrator for Water.

Summary of Proposed Water Quality

# 1. Aluminum

Freshwater Aquatic Life. Freshwater organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, when the pH is between 6.5 and 9.0, if the four-day average concentration of aluminum does not exceed 150 μg/L more than once every three years on the average and if the one-hour average concentration does not exceed 950 µg/L more than once every three years on the average. EPA recommends applying the criteria for metals using the total recoverable method until a protocol for the measurement of "acid-soluble" metals is approved.

The allowed average excursion frequency of three years is the Agency's best scientific judgment of the amount of time it will take an unstressed system to recover from a pollution event in which exposure to these pollutants exceeds the criteria. Stressed systems, for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilience of ecosystems and their ability to recover differ greatly, however, and site-specific excursion frequencies may be established if adequate justification is provided.

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Saltwater Aquatic Life. EPA feels there is no significant need for a saltwater criterion for aluminum.

### 2. Chlorpyrifos

Freshwater Aquatic Life. Freshwater aquatic organisms and their uses should  not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration of chlorpyrifos does not exceed 0.033 µg/L more than once every three years on the average and if the one-hour average concentration does not exceed 0.083 µg/ L more than once every three years on the average.

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Saltwater Aquatic Life. Saltwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a local important species is very sensitive, if the four-day average concentration of chlorpyrifos does not exceed 0.0015 µg/L more than once every three years on the average, and if the one-hour average concentration does not exceed 0.0038 µg/L more than once every three years on the average.

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### 3. Nickel

Freshwater Aquatic Life. Freshwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration (in µg/L) of nickel does not exceed the numerical value given by (0.8460[1n(hardness)]+ 1.1645) more than once every three years on the average, and if the one-hour average concentration (in  $\mu g/L$ ) does \*\*\*55 not exceed the numerical value given by (0.8460[1n (hardness)] +3.3612) more than once every three years on the average. For example, at hardnesses of 50, 100 and 200 mg/L as CaCO<sub>3</sub> the fourday average concentrations of nickel are 88, 160 and 280 µg/L, respectively, and the one-hour average concentrations are 790, 1400 and 2500 µg/L. EPA recommends applying the criteria for metals using the total recoverable method until a protocol for the measurement of "acid-soluble" metals is approved. -

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Saltwater Aquatic Life. Saltwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration of nickel does not exceed 7.9 µg/L more than once every three years on the average, and if the one-hour average concentration of nickel does not exceed 71 µg/L more than once every three years on the average.

EPA recommends applying the criteria for metals using the total recoverable method until a protocol for the measurement of "acid-soluble" metals is approved.

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# 4. Pentachlorophenol was a track.

Freshwater Aquatic Life. Freshwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration (in  $\mu g/L$ ) of pentachlorophenol does not exceed the numerical value given by (1.005[pH]-5 .368) more than once every three years on the average, and if the one-hour average concentration (in  $\mu g/L$ ) does not exceed the numerical value given by •(1.005[pH]-4.908) more than once every three years on the average. For example, at pH=6.5, 7.8, and 9.0, the four-day average concentrations of pentachlorophenol are 3.2, 12 and 40 µg/ L, respectively, and the one-hour average concentrations are 5.1, 19 and

The allowed average excursion frequency of three years is the Agency's best scientific judgement of the amount of time it will take an unstressed system to recover from a pollution event in which exposure to these pollutants exceeds the criteria. Stressed systems. for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilience of ecosystems and their ability to recover differ greatly, however, and site-specific excursion frequencies may be established if adequate justification is provided.

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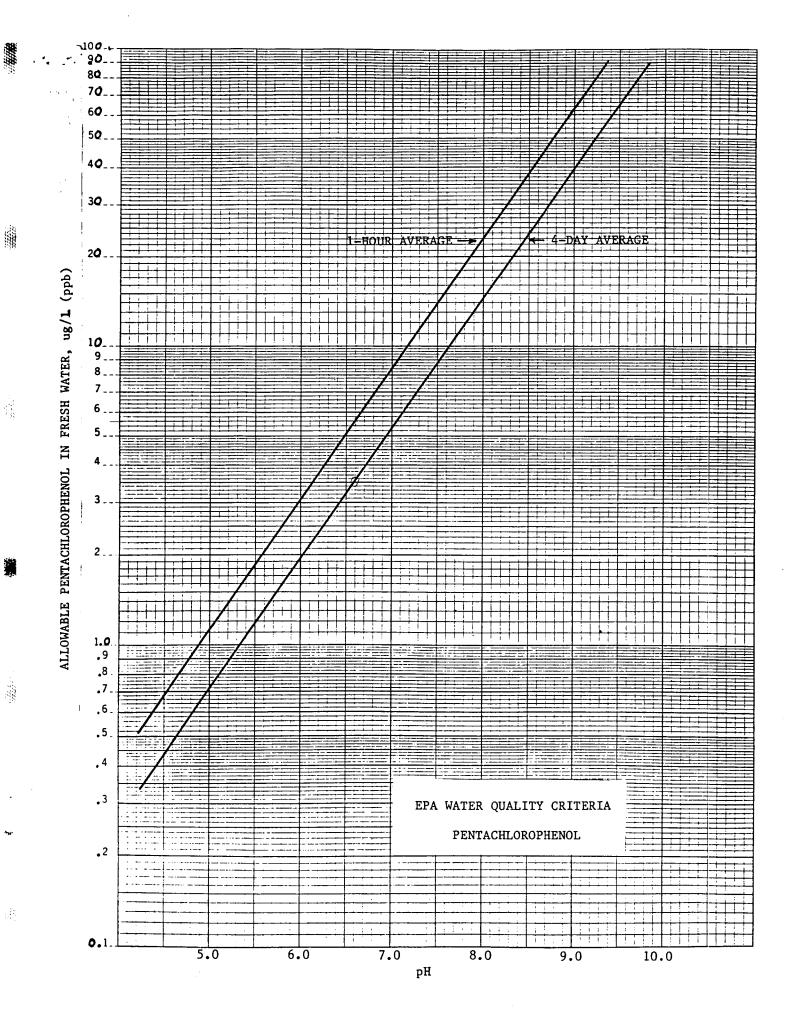
Concentration (CMC) design flow and 7Q5 or 7Q10 for the Criterion Continuous Concentration (CCC) design flow in steady-state model for unstressed and stressed systems respectively. These matters are discussed in more detail in the Technical Support Document for Water Quality-Based Toxics Control (U.S. EPA. 1985).

Saltwater Aquatic Life. Saltwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration of pentachlorophenol does not exceed 8.1 µg/L more than once every three years on the average, and if the one-hour average concentration does not exceed 13 µg/L more than once every three years on the average.

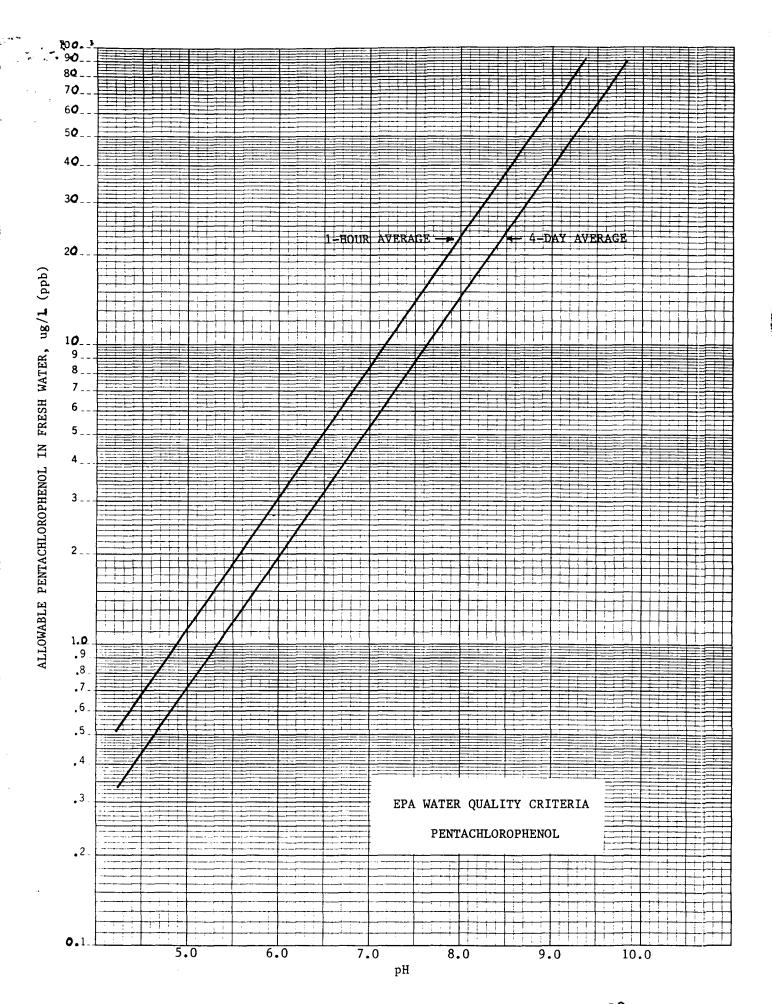
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[FR Doc. 86-5161 Filed 3-10-86; 8:45 am]
BILLING CODE 6560-50-M



TOLS010725



TOLS010726



# MEMORANDUM

February 27, 1987

TO:

Jock Streidl

Seattle

FROM:

John Denham

Seattle

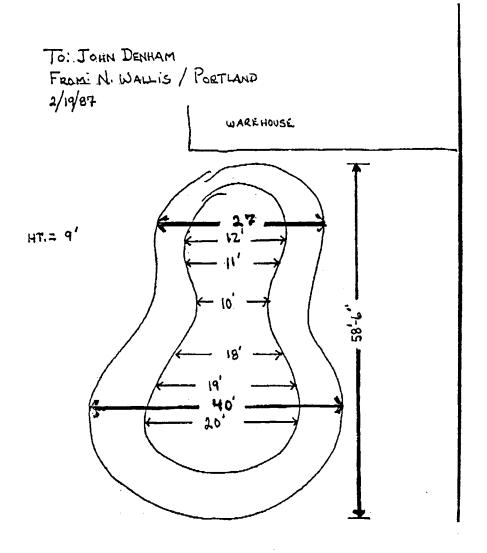
SUBJECT: PENTACHLOROPHENOL AT NORTHWEST TERMINAL

Per your 2/19/87 request, I contacted Waste Tech Inc. (John Wurster (303) 279-9712) to obtain a cost estimate for on-site incineration of PCP in the soil at Northwest.

Waste Tech desired to know the cubic yards of soil and the average ppm of PCP contamination. Using data from enclosures 1 and 2, 1550 cubic yards and 1851 ppm resulted. Waste Tech advised by telecon yesterday that the job would take a little more than one year to complete and the cost would be about 2 million dollars.

I thanked them.

JPD/ch



Above ground 58 x 34 x 9 = 17748

Below ground 58 x 34 x 12 = 23664

414241 ÷ 27 = 1534

1550 cubic yards

TOLS010728

ENCL. 1

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ENCL, 2

# **ENVIRONMENTAL CHEMISTS**

Andrew John Friedman James E. Bruya, Ph.D. (206) 285-8282 3008-B 16th Avenue West Seattle, WA 98119 FAX: (206) 283-5044

September 13, 1989

Fred Proby, Environmental Specialist Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Dear Mr. Proby:

Enclosed are the results of the analyses of samples submitted on August 24, 1989 from your Northwest Terminal Project under PO# 73273.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this material, or if you just want to discuss any aspect of your projects, please do not hesitate to contact me.

Sincerely,

Onder for Friedman, Chemist

AJF

Enclosures

# **ENVIRONMENTAL CHEMISTS**

Date of Report: September 13, 1989 Date Submitted: August 24, 1989

Project: Northwest Terminal

# FINGERPRINT CHARACTERIZATION BY CAPILLARY GAS CHROMATOGRAPHY

Sample #

GC Characterization

T-3 (Liquid)

The gas chromatographic trace was indicative of mineral spirits and a heavier material, similar in weight to a fuel oil, but without the usual distribution of hydrocarbons present. This could be indicative of a very heavily degraded petroleum product, or be simply a build-up of biogenic hydrocarbons and waxes. Without standards to compare on the same GC column we are unable to determine if the mineral spirits fraction is similar to any of the specific products mentioned in your request.

WL2

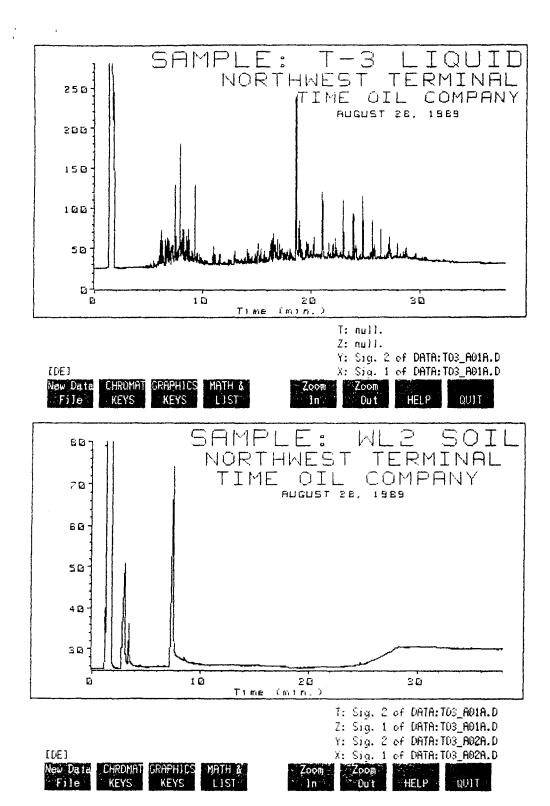
The gas chromatographic trace contained three peaks. The first has been tentatively identified by mass spectrometry to be 2-Methyl-2-propenaldehyde (methacrolein, possibly responsible for the strong odor associated with the sample. The second peak has not been identified and the third peak has been tentatively identified by mass spectrometry as a methyl ester of hexanoic acid. These identifications are tentative as we do not have standards for either of the two compounds.

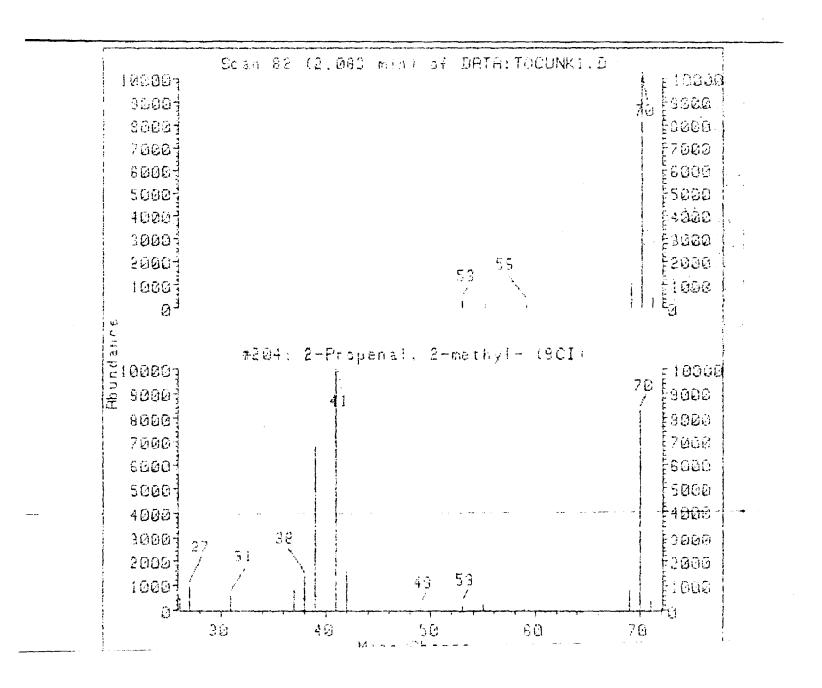
# **ENVIRONMENTAL CHEMISTS**

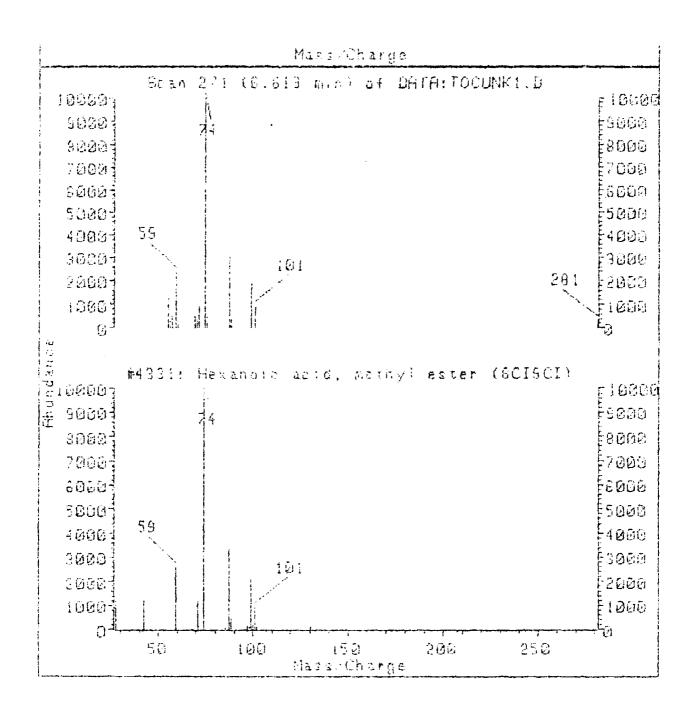
Date of Report: September 13, 1989 Date Submitted: August 24, 1989 Project: Northwest Terminal

# RESULTS OF ANALYSES OF ENVIRONMENTAL SAMPLES FOR PENTACHLOROPHENOL (PCP) BY GC/ECD Results Reported as $\mu g/g$ (ppm)

Sample #	PCP (ppm)
T-3	200
WL2	1
Quality Assurance	
Method Blank	<1
WL2 (Duplicate)	1
WL2 (Matrix Spike) . Spiked @ 10 ppm Percent Recovery	80%
WL2 (Matrix Spike Duplicate) Spiked @ 10 ppm Percent Recovery	40%









# TIME OIL CO.

P.O. BOX 24447 • TERMINAL ANNEX

2737 WEST COMMODORE WAY • SEATTLE, WASHINGTON 98124-0447
(206) 285-2400

No. 7327

PLACE THIS NUMBER ON YOUR INVOICE AND ALL CORRESPONDENCE

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	5	eattle	UA S	8/24/89	SHIP BY	
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# **ENVIRONMENTAL CHEMISTS**

Andrew John Friedman James E. Bruya, Ph.D. (206) 285-8282

3008-B 16th Avenue West Seattle, WA 98119 FAX: (206) 283-5044

# INVOICE # 89TOC0913-1

September 13, 1989

Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Billing for the analyses of environmental samples Re:

submitted on August 24, 1989 from your Northwest Terminal Project and reported to Fred Proby, Environmental Specialist under PO # 73273.

Penta cleanus

2 samples characterized by capillary gas chromatography PREFERRED CLIENT @ \$125 per sample

\$ 125.00

1 sample analyzed for Total PCB as Arochlor 1254 by GC/ECD @ \$85 per sample

85.00

Amount Due ..... \$ 210.00

Econa Project: 862.50 Separate TOC investigation: 147.50

### TIME OIL CO. SAMPLE LOG NW Address: Northwest Terminal Berninal Terminal Site Name: Prop. No: 03-123 PorHand Sampler: 8/23/89 Fred Date: D R Purpose: Pump Bailer Method: Grab 📈 Spoon Lab Name: F&B Preserve Acid None X Ice 285-8282 Address: Phone: PO No.: **Analysis Instructions** Sample # EPA Method # Location Type T3 Reactor (S W) & BTEX TH: SWP BTEX **TPH** W22 Water Li S)WP*⊒BTÆX* TPH **TPH** SWP BTEX SWP BTEX **TPH TPH** SWP BTEX \_ W P BTEX **TPH** SWP BTEX **TPH** BTEX SWP **TPH** W P BTEX **TPH** 10 TPH W P BTEX BTEX TPH WP 1 12 W P BTEX **TPH** 13 WP BTEX **TPH** 14 WP BTEX **TPH** 15 BTEX **TPH** SWP 16 BTEX W P **TPH** 17 BTEX **TPH** W P W P BTEX **TPH** 19 WP BTEX TPH W P BTEX **TPH** 21 WP **TPH** BTEX 22 SWP BTEX **TPH** 23 SWP BTEX TPH Sample Count = 1 Check sample jar count against Log! CHAIN OF CUSTODY RECORD

Relinquished By:	Received By:		Date & Time
Relinquished By: Ral	Received For Lab By:	Jun 2 pra	Date & Time: 8/24/89 1:30
G	ENERAL LAB IN	STRUCTIO	DNS
Please enter the folio	wing information		
1. Sample ID Numbers assign	ned by Lab:	to	
2. Name of Person Performin	g Analysis:		Date Analysed:
<ol><li>Scheduled sample disposa</li></ol>	Il date:	PLE	ASE NOTIFY BEFORE DISPOSAL
IMPORTANTI PLEASE	ATTACH A COPY OF THIS F	ORM TO YOUR I	REPORT TO TIME OIL CO.
Attention: Joe Sanzo, En	nvironmental Manager, PO B	ox 24447 Term.S	ta., Seattle, WA 98124

J-Methyl, Z-Properal

Methylpropenal

H-C=C-C=O

Ct/3

Methylpropenal

Methylpropenal

Methylpropenal

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Spont Heating: No.

To Fight Fire: CO<sub>2</sub>, dry chemical.

## METAL OXIDES.

THR = React violently with BrF<sub>5</sub>, performic acid. [19]

# METAL POLISH LIQUID. flash p: <0°F.

THR = Details U. Some metal polishes can act as irr and allergens.

Fire Hazard: Dangerous, when exposed to heat or flame; can react vigorously with oxidizing materials. Explosion Hazard: U.

### METALS.

THR = Violent reactions with NH<sub>4</sub>NO<sub>3</sub>, BrF<sub>5</sub>, BrF<sub>3</sub>, chlorates, performic acid. [19]

# METAL SULFIDES.

THR = Reacts violently with bromates, chlorates, HClO<sub>3</sub>, hydrazine mononitrate, iodates, Ag<sub>2</sub>O. [19] See individual sulfides.

METANILIC ACID, SODIUM SALT. See m-aniline sodium sulfonate.

**METASQUALENE.**  $C_{27}H_{32}O_2NCl$ , mw: 438.1. THR = An exper teratogen. [3]

META-SYSTOX. Syn: o-[2-(ethylthio) ethyl]-o,o-dimethyl phosphorothioate. An oily liquid, slightly sol in water. C<sub>6</sub>H<sub>15</sub>O<sub>3</sub>PS<sub>2</sub>, mw: 230.1, d: 1.20.

Acute tox data: Oral LD<sub>50</sub> (rat) = 180 mg/kg. [3]

THR = HIGH via oral route. A cholinesterase inhibitor. See parathion. An insecticide and acaricide.

α-METHACROLEIN. Syn: methylpropenal. Colorless liquid. CH<sub>2</sub>C(CH<sub>3</sub>)CHO, mw: 70.1, bp: 73.5°, flash p: 35° F (OC), d: 0.830 @ 20°/4°, vap. press: 120 mm @ 20°, vap. d: 2.42.

Acute tox data: Oral LD<sub>50</sub> (rat) = 111 mg/kg; inhal LC<sub>1.0</sub> (rat) = 125 ppm for 4 hrs; dermal LD<sub>50</sub> (rabbit) = 430 mg/kg. [3]

THR = HIGH irr to skin, eyes and mu mem and via oral, inhal and dermal routes.

Fire Hazard: Dangerous; when exposed to heat, flame or oxidizers.

Explosion Hazard: U.

Disaster Hazard: Dangerous; on decomp, emits toxic fumes; can react vigorously with oxidizing materials.

To Fight Fire: CO<sub>2</sub>, alcohol foam, foam, dry chemical.

METHACRYLIC ACID. Syn: α-methylacrylic acid. Corrosive liquid or colorless crystals.

(CH<sub>3</sub>)(CH<sub>2</sub>)CCOOH, mw: 86.1, mp: 15°, bp: 161°, flash p: 171°F (COC), d: 1.014 @ 25° (glacial), vap. press: 1 mm @ 25.5°.

Acute tox data: ipLD<sub>50</sub> (mouse) = 48 mg/kg. [3] THR = HIGH irr to skin, eyes and mu mem and via ip route. Fire Hazard: Mod, when exposed to heat; flame or oxidizers.

Disaster Hazard: Dangerous; when heated to decomp, emits toxic fumes.

To Fight Fire: Alcohol foam, spray, mist, dry chemical.

β-METHACRYLIC ACID. See crotonic acid.

METHACRYLONITRILE. Syn: 2-methylpropenitrile.  $H_2C = C(CH_3)C = N$ , mw: 67.09, mp: -36°, bp: 90.3°, d: 0.805, vap. press: 40 mm @ 12.8°, flash p: 55°F.

Acute tox data: Oral LD<sub>50</sub> (rat) = 250 mg/kg; inhal LC<sub>50</sub> (rat) = 328 ppm for 4 hrs; dermal LD<sub>50</sub> (rabbit) = 320 mg/kg. [3]

THR = HIGH via oral, inhal and dermal routes. A poison, see nitriles.

1,4(8)-p-METHADIENE. See terpinolene.

**METHAHEXAMIDE.**  $C_{14}H_{21}O_3N_9S$ , mw: 311.4. THR = An exper teratogen. [3]

1-METHALLYL ALCOHOL. Syn: 2-buten-1-ol. Colorless liquid. CH<sub>3</sub>CHCHCH<sub>2</sub>OH, mw: 72.1, mp: <30°, bp: 118°, flash p: 92°F, d: 0.8726 @ 0°/4°, vap. d: 2.49.

Acute tox data: Oral LD<sub>LO</sub> (mouse) = 500 mg/kg; inhal LC<sub>LO</sub> (mouse) = 2924 ppm for 2 hrs; dermal LD<sub>LO</sub> (rabbit) = 2000 mg/kg. [3]

THR = MOD via oral, inhal and dermal routes.

Fire Hazard: Dangerous, when exposed to heat or flame; can react with oxidizing materials.

To Fight Fire: Alcohol foam, CO<sub>2</sub>, dry chemical.

METHALLYL CHLORIDE. Syn: 2-chlorobutene-2. Colorless, volatile liquid, disagreeable odor.  $C_4H_7Cl$ , mw: 90.55, bp: 72.17°, lel = 3.2%. uel = 8.1%, fp:  $<-80^\circ$ , flash p: 11°F, d: 0.9257 @ 20°/4°. vap. press: 101.7 mm @ 20°, vap. d: 3.12.

Acute tox data: Inhal LC<sub>50</sub> (rat) = 2000 mg/m<sup>3</sup> for 24 hrs; inhal LC<sub>LO</sub> (mouse) = 9100 mg/m<sup>3</sup> for 10 min. [3]

THR = MOD via inhal route. An irr.

Fire Hazard: Dangerous, when exposed to heat, flame or oxidizers.

Explosion Hazard: Mod, when exposed to heat or

Disaster Hazard: Dangerous; on decomp, emits highly toxic fumes of chlorides; can react vigorously with oxidizing materials.

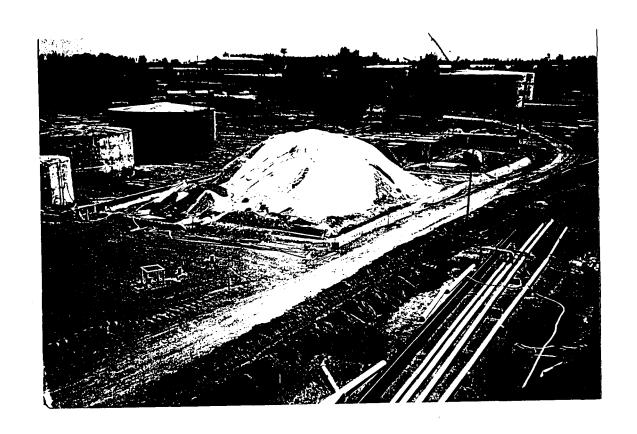
To Fight Fire: Alcohol foam, CO2, dry chemical.

# METHAMPHETAMINE HYDROCHLORIDE.

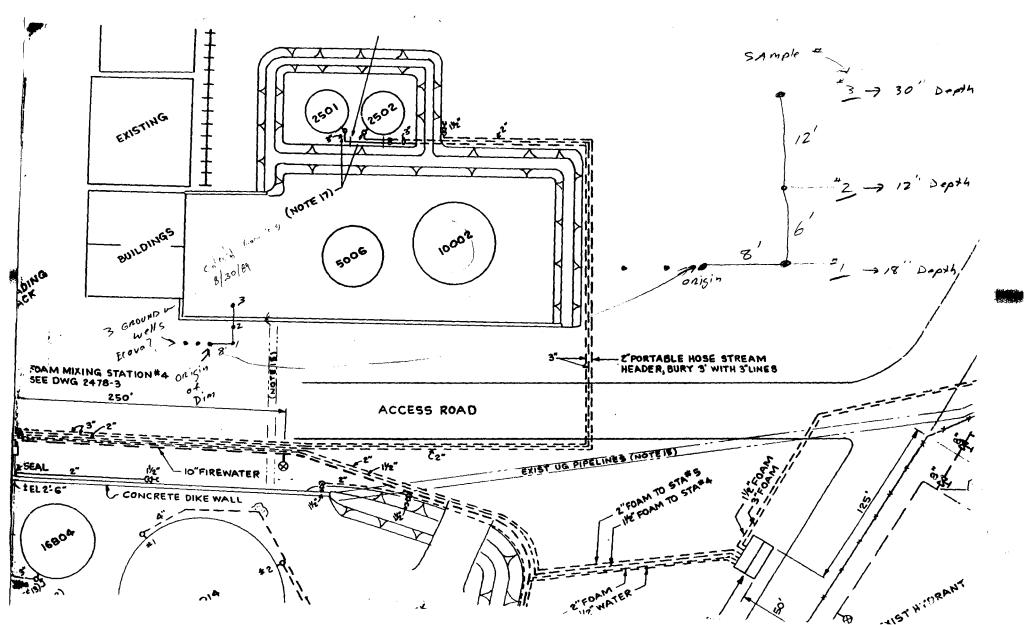
 $C_{10}H_{15}N \cdot HCl, mw: 185.7.$ 

THR = HIGH acute via oral route. An exper teratogen. [3]

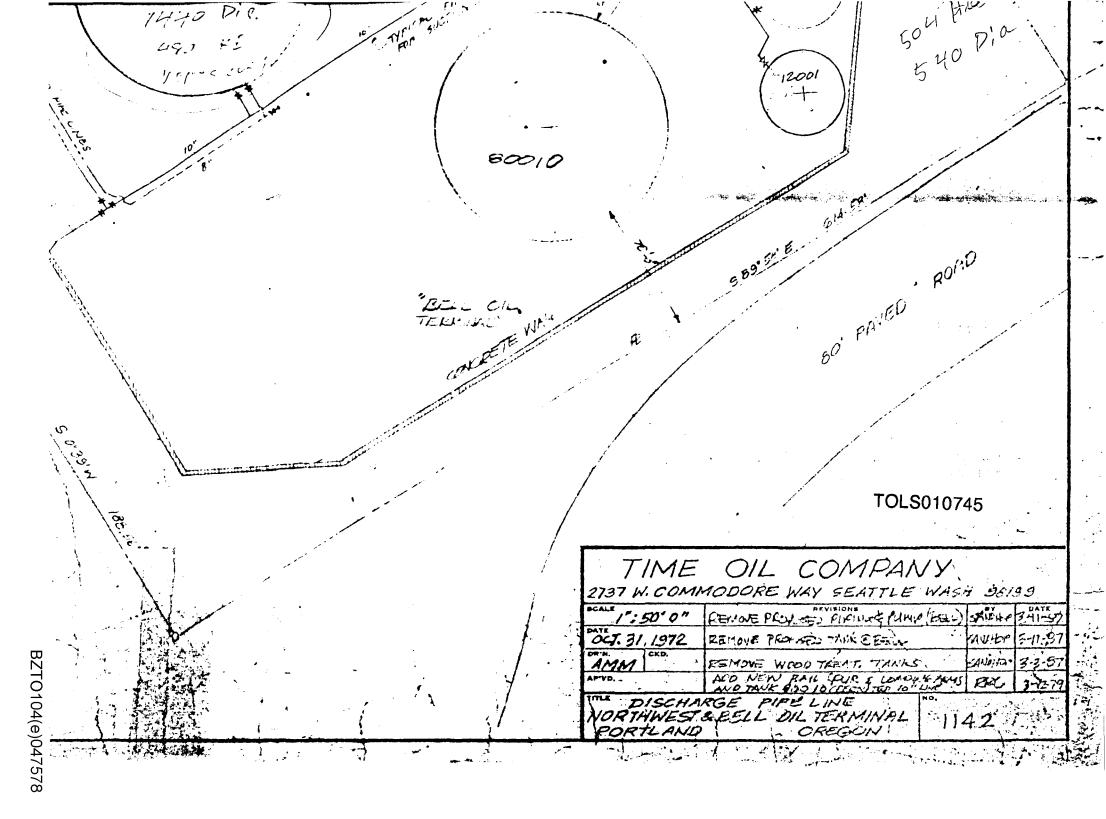
For Countermeasure Information and Abbreviations see the Directory at the Beginning of this Section.



NU & BFIC 8-9-89



(107) (104) H Dooth 48"  (22 Dooth 5'S"  (22 Dooth 2'S")	COVA monitaring well 3-123-B	# 45/ # 45/ # 45/ # 45/	B E 2 m TOLS010744
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#### **ENVIRONMENTAL CHEMISTS**

Andrew John Friedman James E. Bruya, Ph.D. (206) 285-8282 3008-B 16th Avenue West Seattle, WA 98119 FAX: (206) 283-5044

October 4, 1989

Fred Proby, Environmental Specialist Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Dear Mr. Proby:

Enclosed are the results of the analyses of samples submitted on September 13, 1989 from your N W Penta Project under PO # 73278. Since we still do not have a KB-3 standard, we were unable to perform an analysis for this material. The matrix spike recovery for the sediment sample was outside the usually expected zones, but if you look at the duplication data for the same sample, you will note that there is a fair amount of inhomogeneity to this material. The spiked amount was in a similar magnitude to this variability and this probably is the reason for the very high recovery.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this material, or if you just want to discuss any aspect of your projects, please do not hesitate to contact me.

Sincerely,

Andrew John Friedman, Chemist

alider The Trick

AJF

Enclosures

#### **ENVIRONMENTAL CHEMISTS**

Date of Report: October 4, 1989 Date Submitted: September 13, 1989

Project: N W Penta

# RESULTS OF ANALYSES OF ENVIRONMENTAL SAMPLES FOR PENTACHLOROPHENOL (PCP) BY GC/ECD Results Reported as µg/g (ppm)

Sample #	PCP (ppm)
Reactor T3-W	<1
Reactor T3-S	30
Quality Assurance	
Method Blank	<1
Reactor T3-W (Duplicate)	<1
Reactor T3-S (Duplicate)	40
Reactor T3-W (Matrix Spike) Spiked @ 10 ppm Percent Recovery	85%
Reactor T3-S (Matrix Spike) Spiked @ 10 ppm Percent Recovery	250%

	TIME	OIL CO. S	AMPLE	LOG				
تite Name:	NW Pentar	Prop.	No:	Address:	x) orthug	est Terminal		
Sampler:	Fred Poby		ite: 9/12/89		Partland			
Purpose:	Check Reactor pre		od: Grab	S.Spoon	Bailer	Pump		
Lab Name:	F\$B	Preserv	red: Ice	Acid	None 🔯	· Ш		
Lab Address			Phone:		PO No.:	73278		
0 1 - "					r			
Sample #	Location/Descrip			ysis Instructions		EPA Method		
T3-W	- Reactor T3 was		Penta	J K83"	<u> </u>	9025		
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This means you GENERAL LAB INSTRUCTIONS								
Please D	provide the request	ed information						
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· ·	performing analysis:	J. Holmes		Reviewer:	-			
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1	copies of ALL chromatogra							
and a subsequence of a const	And the control of th				PORT TO T	ME OIL CO		
	IMPORTANT! PLEASE RETURN A COPY OF THIS FORM WITH YOUR REPORT TO TIME OIL CO.  Attn: Environmental Manager, PO Box 24447 Terminal Sta., Seattle, WA 98124 (206) 285–2400							

#### **ENVIRONMENTAL CHEMISTS**

Andrew John Friedman James E. Bruya, Ph.D. (206) 285-8282 3008-B 16th Avenue West Seattle, WA 98119 FAX: (206) 283-5044

#### INVOICE #89TOC1004-1

October 4, 1989

Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Re: Billing for the analyses of environmental samples submitted on September 13, 1989 from your N W Penta Project and reported to Fred Proby, Environmental Specialist, under PO # 73278.

2 samples analyzed for Pentchlorophenol (PCP) by GC/ECD @ \$85 per sample

\$ 170.00

Amount Due ..... \$ 170.00

CO CIV AUTH
VIND AUTH
PAY 732.78
FIND FALLER
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TAP-130 12/85

#### TIME OIL CO.

P.O. BOX 24447 • TERMINAL ANNEX

2737 WEST COMMODORE WAY 

• SEATTLE, WASHINGTON 98124-0447 (206) 285-2400

NO.

PLACE THIS NUMBER ON YOUR INVOICE AND ALL CORRESPONDENCE Ifre W 9/13/89 NET UNIT PRICE QUANTITY PART NO. DESCRIPTION AMOUNT 85° 170 62.50 FOR RESALE TAXABLE WASHINGTON STATE RESALE CERTIFICATE #C178-47526 THIS PURCHASE IS EXPENSE OF: OTHER SERVICE STATION ISHOW ADDRESS AND OPERATOR F Τ. Ο. C. REQUESTED BY

#### **ENVIRONMENTAL CHEMISTS**

Andrew John Friedman James E. Bruya, Ph.D. (206) 285-8282 3008-B 16th Avenue West Seattle, WA 98119 FAX: (206) 283-5044

December 1, 1989

Fred Proby, Environmental Specialist Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Dear Mr. Proby:

Enclosed are the results of the analyses of samples submitted on November 3, 1989 from Project 03-123, Under PO #73294.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this material, or if you just want to discuss any aspect of your projects, please do not hesitate to contact me.

Sincerely,

Andrew John Friedman, Chemist

AJF

Enclosures

#### **ENVIRONMENTAL CHEMISTS**

Date of Report: December 1, 1989 Date Submitted: November 3, 1989 Project: 03-123, Under PO# 73294

## RESULTS OF ANALYSES OF ENVIRONMENTAL SAMPLES FOR SOLVENT KB-3 BY GC/FID Results Reported as $\mu g/g$ (ppm)

Sample #	<u>KB-3</u> (ppm)
T1-4-1102-1L	70
T1-4-1102-2S	40
Quality Assurance	
Method Blank	<10
T1-4-1102-25 (Duplicate)	40
T1-4-1102-25 (Matrix Spike) Spiked @ 1,000 ppm Percent Recovery	81%
T1-4-1102-25 (Matrix Spike Duplicate) Spiked @ 1,000 ppm	
Percent Recovery	83%

#### **ENVIRONMENTAL CHEMISTS**

Date of Report: December 1, 1989 Date Submitted: November 3, 1989 Project: 03-123, Under PO# 73294

## RESULTS OF ANALYSES OF ENVIRONMENTAL SAMPLES FOR PENTACHLOROPHENOL (PCP) BY GC/ECD Results Reported as $\mu g/g$ (ppm)

Sample #	PCP (ppm)
T1-4-1102-1L	<0.01
T1-4-1102-25	0.2
3123-1102-Rock	35,000 <sup>a</sup>
Quality Assurance	
Method Blank	<0.01
T1-4-1102-25 (Matrix Spike) Spiked @ 50 ppm Percent Recovery	20 <b>%</b> b
T1-4-1102-25 (Matrix Spike) Spiked @ 50 ppm Percent Recovery	20 <b>%</b> b

a - Value reported exceeded the calibration range established for the sample.

**b** - This sample was probably mis-spiked and spiked at 10 ppm.

### TIME OIL CO. SAMPLE LOG

	<del></del>	<del></del>						
Site Name: NW Terminal	Prop. N	10: 03-123 Address: 12005 NB	usard					
Sampler: Fred Proby		ie: 11/1/89 Portland	OR					
Purpose: Tack Cleanup Progress	Metho	d: Grab S.Spoon Bailer	Pump					
Lab Name: FiB	- Preserve	ed: Ice 🔀 💮 Acid 🔲 None 🗌	]					
Lab Address:		Phone: 285~8282 PO No.:	73294					
Sample # Location/Description	Type*	Analysis Instructions	EPA Method					
T1-4-402-11 Liquil Crom Reacher T1	S(W)P	Penda & KB3						
Ti-4-1102-25 Sediment from TI	SW P	Penta & K133						
3123-1102 PCP Penta Trush Pile	s w(P)	Hold for confirmation analyse	itneeded					
3123-1102-Rock Penta Trash Pile	(S) W P	Penta	<u> </u>					
-	SWP							
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Relinquished By: Tend And Received For	Lab By:	Date & Time: 1/1	3/89 1:30					
GENERAL LAB INSTRUCTIONS								
Please provide the requested inform	nation							
1. Sample numbers assigned by Lab:		to Date Analyzed	<b>i</b> :					
2. Person performing analysis:		Data Reviewer:						
3. Scheduled sample disposal date:	<del></del>	NOTIFY TIME OIL CO. BEFORE	DISPOSAL					
4. Provide copies of ALL chromatograms, including QA/QC runs.								
IMPORTANT! PLEASE RETURN A COPY OF THIS FORM WITH YOUR REPORT TO TIME OIL CO.								
		•						
Attn: Environmental Manager, PO Box 244	<u>4/ 1erm</u>	imai Sta., Seattle, WA 98124 (206) 2	00-2400					

#### **ENVIRONMENTAL CHEMISTS**

Andrew John Friedman James E. Bruya, Ph.D. (206) 285-8282

INVOICE #89TOC1130-1

3008-B 16th Avenue West Seattle, WA 98119 FAX: (206) 283-5044

December 1, 1989

Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Re: Billing for the analyses of environmental samples submitted on November 3, 1989 from Project 03-123, Under PO# 73294 and reported to Fred Proby, Environmental Specialist.

NW Termin Penta

2 samples analyzed for KB-3
by GC/FID @ \$85 per sample

170.00

3 samples analyzed for Pentachlorophenol by GC/ECD @ \$85 per sample

255.00

Amount Due ..... \$ 425.00

CO...DIV....AUTH

INV.....PO....PRICE

DUE.....MO...REPART SIG

### TIME OIL CO. SAMPLE LOG

Site Name: NW Terminal	Prop. No: 03-123 Address: 12005 N Burgard
Sampler: Fred Proby	Date: 11/1/89 Fortland OR
Purpose: Fact Cleaning Progress	Method: Grab X S.Spoon Bailer Pump
Lab Name: FiB	Preserved: Ice Acid None
Lab Address:	Phone: 285-8282 PO No.: 73294
Sample # Location/Description	Type* Analysis Instructions EPA Method
T1-4-402-11 Liquil Grom Reactor T1	SMP Penda & 433
71-4-1102-25 Sediment from T1	OWP Penta & KBZ
3123-1102 PCP Penta Trush Pile	SWO Hold for confirmation analyse it needed
3123-1102-Rode Penha Trash Pile	OWP Penta
-	SWP
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Other Instructions: Item 4 - Could Asis be rec	crystallized Penta?
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Sample Count ≈ Check sample jar count again	inst Log!
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Relinquished By: Sent On Received For	1 Lab By: A Gatriel Date & Time: 11/3/89 1:30
GÉNERAL L	AB INSTRUCTIONS
Please provide the requested inform	mation
Sample numbers assigned by Lab:	
2. Person performing analysis:	Data Reviewer:
Scheduled sample disposal date:	NOTIFY TIME OIL CO. BEFORE DISPOSAL
4. Provide copies of ALL chromatograms, including	
	Y OF THIS FORM WITH YOUR REPORT TO TIME OIL CO.
	447 Terminal Sta., Seattle, WA 98124 (206) 285–2400



### TIME OIL CO.

A Section 1 and 1 and 1

P.O. BOX 24447 • TERMINAL ANNEX
2737 WEST COMMODORE WAY • SEATTLE, WASHINGTON 98124-0447 (206) 285-2400

No.

PLACE THIS NUMBER ON YOUR INVOICE AND ALL CORRESPONDENCE

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TAP-130 1	2/85									

#### **ENVIRONMENTAL CHEMISTS**

Andrew John Friedman James E. Bruya, Ph.D. (206) 285-8282 3008-B 16th Avenue West Seattle, WA 98119 FAX: (206) 283-5044

December 1, 1989

Fred Proby, Environmental Specialist Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Dear Mr. Proby:

Enclosed are the results of the analyses of samples submitted on October 25, 1989 from Project 03-123, under PO#73292.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this material, or if you just want to discuss any aspect of your projects, please do not hesitate to contact me.

Sincerely,

Cedan Jh Fuel Andrew John Friedman, Chemist

AJF

Enclosures

#### **ENVIRONMENTAL CHEMISTS**

Date of Report: December 1, 1989 Date Submitted: October 25, 1989 Project: 03-123, under PO#73292

## RESULTS OF ANALYSES OF SAMPLES FOR GASOLINE, DIESEL AND KB-3 BY GC/FID Results Reported as $\mu g/g$ (ppm)

Sample #	Gasoline (ppm)	<u>Diesel</u> (ppm)	<u>KB-3</u> (ppm)
3123-1024-C1	<1	150	
3123-1024-C2	400 <b>a</b>	580	
3123-1024-T1-W			<10
3123-1024-T1-S			<10
Quality Assurance			
Method Blank	<1	<10	<10
3123-1024-C1 (Duplicate)	<1	180	
3123-1024-T1-W (Duplicat	e)		<10
3123-1024-Cl (Matrix Spike) Spiked @ 50 ppm Percent Recovery	220%	98 <b>%</b>	
3123-1024-C1 (Matrix Spike Duplicate Spiked @ 50 ppm Percent Recovery	220%	93%	
3123-1024-T1-W (Matrix Spike) Spiked @ 50 ppm Percent Recovery			84%
3123-1024-T1-W (Matrix Spike Duplicate Spiked @ 50 ppm Percent Recovery	)		81%

#### **ENVIRONMENTAL CHEMISTS**

Date of Report: December 1, 1989 Date Submitted: October 25, 1989 Project: 03-123, under PO#73292

## RESULTS OF ANALYSES OF ENVIRONMENTAL SAMPLES FOR PENTACHLOROPHENOL (PCP) BY GC/ECD Results Reported as $\mu g/g$ (ppm)

Sample #	(ppm)
3123-1024-PCP	82,000 <sup>a</sup>
3123-1024-DISP-1	<1
3123-1024-T1-W	<10 <b>b</b>
3123-1024-T1-S	<1
3123-1024-WAX	10
Quality Assurance	
Method Blank	<1
3123-1024-DISP-1 (Duplicate)	<1
3123-1024-DISP-1 (Matrix Spike) Spiked @ 10 ppm Percent Recovery	100%
3123-1024-DISP-1 (Matrix Spike Duplicate) Spiked @ 10 ppm Percent Recovery	92%

 $<sup>^{\</sup>mathbf{a}}$  - Value reported exceeded the calibration range established for the sample.

b - Interferences were present which interfered with the identification and quantitation of the analyte indicated.

#### **ENVIRONMENTAL CHEMISTS**

Date of Report: December 1, 1989 Date Submitted: October 25, 1989 Project: 03-123, under PO#73292

## RESULTS OF ANALYSES OF ENVIRONMENTAL SAMPLES FOR WATER SOLUBILITY Results Reported as Percent of Total Material

Sample #

Solubility (%)

3123-1024-PCP

14%a

a - The sample was dried at 100 °C overnight and then mixed with water. The water was decanted, the sample dried again, and then re-weighed.

#### **ENVIRONMENTAL CHEMISTS**

Date of Report: December 1, 1989 Date Submitted: October 25, 1989 Project: 03-123, under PO#73292

### RESULTS OF THE EXAMINATION OF ENVIRONMENTAL SAMPLES FOR IDENTIFICATION

Sample 3123-1024-WAX was examined by extraction with organic solvents and found to be primarily inorganic in nature. Solubility was most pronounced in hydrochloric acid, with little solubility in nitric acic. The dried sample was hard and considerably more dense than the wet material. After discussing these results with your office, we concluded that the material was not a wax, but probably bentonite.

### TIME OIL CO. SAMPLE LOG

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✓ Γ <sup>∞</sup>	3123-1024		Reactor		SWP	Penda	-	(B3			<del> </del> -	
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2	Attn: Envir	onmenta	Manager, Po	O Box 244	47 Teri	minal Sta.,	Seattle	, WA 9	8124 (2	206) 2	85-2400	

#### **ENVIRONMENTAL CHEMISTS**

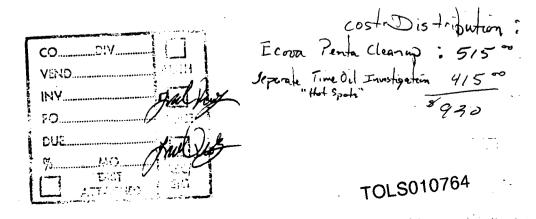
#### INVOICE #89TOC1130-3

December 1, 1989

Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Billing for the analyses of environmental samples submitted on October 25, 1989 from Project 03-123, NW Terminal under PO#73292 and reported to Fred Proby, Environmental Specialist.

2 samples analyzed for Gasoline and Diesel by GC-FID @ \$160 per sample 320,00 2 samples analyzed for KB-3 by GC-FID @ \$85 per sample (per quote) 125,00 5 samples analyzed for Pentachlorophenol by GC/ECD @ \$85 per sample 425.00 1 sample analyzed for water Hot spots solubility @ \$10 per sample 10.00 1 sample analyzed for identification @ \$50 per sample 50.00 930.00 Amount Due .....



Hot Soots



#### TIME OIL CO.

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To Friedman & Bruya

P.O. BOX 24447 • TERMINAL ANNEX
2737 WEST COMMODORE WAY • SEATTLE, WASHINGTON 98124-0447
(206) 285-2400

No. 73292

PLACE THIS NUMBER ON YOUR INVOICE AND ALL. CORRESPONDENCE

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#### **ENVIRONMENTAL CHEMISTS**

Andrew John Friedman James E. Bruya, Ph.D. (206) 285-8282 3008-B 16th Avenue West Seattle, WA 98119 FAX: (206) 283-5044

December 1, 1989

Fred Proby, Environmental Specialist Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Dear Mr. Proby:

Enclosed are the results of the analyses of samples submitted on October 9, 1989 from Project 03-123, under PO#73290.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this material, or if you just want to discuss any aspect of your projects, please do not hesitate to contact me.

Sincerely,

andrew John Friedman, Chemist

AJF

Enclosures

#### **ENVIRONMENTAL CHEMISTS**

Date of Report: December 1, 1989 Date Submitted: October 9, 1989 Project: 03-123, under PO#73290

## RESULTS OF ANALYSES OF ENVIRONMENTAL SAMPLES FOR SOLVENT KB-3 BY GC-FID Results Reported as $\mu g/g$ (ppm)

Sample #	<u>KB-3</u> (ppm)
3123-10006-T1-L	50
3123-10006-T1-S	80 <b>a</b>
3123-10006-DP-S	9,600 <b>b</b>

- a This sample also contained ca 20 ppm of a light weight product, possibly a mineral spirit.
- b This sample was the organic layer floating on top of the sample submitted. TLC indicated that this material was largely composed of hydrocarbons, including PNA.

#### **ENVIRONMENTAL CHEMISTS**

Date of Report: December 1, 1989 Date Submitted: October 9, 1989 Project: 03-123, under PO#73290

## RESULTS OF ANALYSES OF ENVIRONMENTAL SAMPLES FOR PENTACHLOROPHENOL (PCP) BY GC/ECD Results Reported as $\mu g/g$ (ppm)

Sample #	PCP (ppm)
3123-10006-T1-L	50
3123-10006-T1-S	37
3123-10006-DP-S	150
Ouality Assurance	
Method Blank	<10
3123-10006-T1-L (Duplicate)	46
3123-10006-T1-L (Matrix Spike) Spiked @ 40 ppm	
Percent Recovery	70%
3123-10006-T1-S (Duplicate)	38
3123-10006-T1-S (Matrix Spike) Spiked @ 40 ppm	
Percent Recovery	140%

#### **ENVIRONMENTAL CHEMISTS**

Andrew John Priedman James E. Bruya, Ph.D. (206) 285-8282 3008-B 16th Avenue West Seattle, WA 98119 FAX: (206) 283-5044

October 20, 1989

Fred Proby, Environmental Specialist

Time Oil Company

273/ West Commodore Way

Seathle, WA 98199

Dea Mr. Proby:

We are continuing the analyses of the analyses of samples submitted on October 9, 1989 from Project 03-123, and will send you a complete report as soon as they are completed. In the interim I wanted to let you know that PCP was found in the liquid sample at ca 50 ppm and in the sludge at ca 37 ppm. Additionally it was found in the surface scum of sample 3123-1006-DP-S at a level of ca 150 ppm. We have not examined the residual materials in this sample for PCP.

All three samples contained residual materials similar in boiling range to KB-3. The soil sample also contains a lighter material, similar in weight to a mineral spirit, not found in significant levels in either of the two other samples. The surface scum noted above was also examined by thir-layer chromatography and noted to contain saturated and aromatic hydrocarbons, as well as more polar materials. These less polar compounds most probably have a petroleum origin.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this material, or if you just want to discuss any aspect of your projects, please do not hesitate to contact me.

Sincerely,

Andrew John Friedman, Chemist

### TIME OIL CO. SAMPLE LOG

Site Name: NW Perter	Prop. No: 23 - 123 Address:		
Sampler: Fred Proby	Date: 10/6/89 Portland OR		
Purpose:	Method: Grab S.Spoon Bailer Pump		
Lab Name: 743	Preserved: Ice Acid None None		
Lab Address:	Phone: PO No.: 73290		
Sample # Location/Description	Type* Analysis Instructions EPA Method		
3,23 TH 15 uid AT1	SWP Penta & 483"		
11-3- Soil +/			
" DP-5 - Seum + Disposed Pd	SWP Penta 4B3 OildGrease, TPH?		
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Other Instructions: 3 item 3 - about is penta partitioning into reser?			
	· O U		
Sample Count = \$ Check sample jar count against Log! *S = Soil W = Water P = Product			
CHAIN OF CUSTODY RECORD			
Relinquished By: Received By:	Date & Time		
Relinquished By July State Beceived For Lab By: Che the Frish Date & Time: 10/9/89 4 pm			
GENERAL LAB INSTRUCTIONS			
Please provide the requested information			
1. Sample numbers assigned by Lab: 9393 to 9395 Date Analyzed:			
2. Person performing analysis:  Data Reviewer:			
3. Scheduled sample disposal date:  NOTIFY TIME OIL CO. BEFORE DISPOSAL			
4. Provide copies of ALL chromatograms, including QA/QC runs.			
IMPORTANTI PLEASE RETURN A COPY OF THIS FORM WITH YOUR REPORT TO TIME OIL CO.			
Attn: Environmental Manager. PO Box 24447 Terminal Sta., Seattle, WA 98124 (206) 285–2400			

#### **ENVIRONMENTAL CHEMISTS**

Andrew John Friedman James E. Bruya, Ph.D. (206) 285-8282

3008-B 16th Avenue West Seattle, WA 98119 FAX: (206) 283-5044

#### INVOICE #89TOC1130-2

December 1, 1989

Time Oil Company 2737 West Commodore Way Seattle, WA 98199

Re: Billing for the analyses of environmental samples submitted on October 9, 1989 from Project 03-123, under PO#73290 and reported to Fred Proby, Environmental

NW Termina

Specialist.

3 samples analyzed for KB-3 by GC-FID @ \$85 per sample

255.00

3 samples analyzed for Total Pentachlorophenol by GC/ECD @ \$85 per sample

255.00

Amount Due ..... \$ 510.00

CODIV	AUTH
INY	Anul Yes
FO	PRICE XI. 7 Park
%	RECI

PURCHASE ORDER



#### TIME OIL CO.

P.O. BOX 24447 • TERMINAL ANNEX
2737 WEST COMMODORE WAY • SEATTLE, WASHINGTON 98124-0447 (206) 285-2400

To Friedman & Bruga

No.

PLACE THIS NUMBER ON YOUR INVOICE AND ALL CORRESPONDENCE

			,				
				" 10/9/	89	SHIP BY	
	QUANTITY	PART NO.	DESCR	IPTION	LIST UNIT PRICE	NET UNIT PRICE	TAUCIMA
	3		Analyses for Pen	ta & "kB-3"		145	435°°
	1		Oil & Greese			60	60
							495
							<u> </u>
	TON STATE	RESALE CERTIFE	TAXABLE	Krul	Section 1	co.	
	RCHASE IS E	XPENSE OF:	T.O.C. OTHER		ATE ANTED		_
F	LOSS	Contradoress and or	od_	NW Termin	al Pe.	nta	
т. О. С.				Cleanup			
ACCOUNT N	<u> </u>		REQUESTED BY	<u> </u>	APPROVED BY		
TAP-130	12/85	\;\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			1		

### TIME OIL CO. SAMPLE LOG

Site Name: NW Triming - Pont	Prop. No: <u>03-123</u> Address: <u>12005</u>	N Barend		
Sampler: Keun Mich	7 Date: 9/12/40 Port.	und OR		
Purpose: July Jumplin	Method: Grab S.Spoon Baile	r Pump		
Lab Name: Fredman Bruss	Preserved: Ice Acid None	•		
Lab Address: 3008-R 16 +4 A. e.	rest South with Phone: PO No.	: 13904		
Sample # Location/Descript	tion Type* /Analysis Instructions	EPA Method		
B123 - 0917 - 5P1	(SWP) PCP/ Droxin	<b>***</b>		
3123 - 0912 - 5PZ	3 W P '	ι ι		
3123 - 0917 - 593	(S) W P	- (1		
3)23 - 0917 - 5P4	③W P			
3123 - 0917 SP5	(S)W P	*		
	(S)W P			
3123 - 0912 - 584	SWP	<u>'</u>		
3123 - 0117 - Blank	SWP			
JUS - OHE BURNE	SWP			
-	SWP			
·	SWP			
-	SWP			
-	SWP			
-	SWP			
	SWP			
Other Instructions: Kun Pent				
Other Instructions: Kun Hent	A TIST MEGA			
Sample Count = 9 Check sample	e jar count against Logi 'S = Soil W	- Water P - Product		
CHAIN OF CUSTODY RECORD				
Relinquished By:	Received By: Date & Tir	ne		
Relinquished By: Must Received For Lab By: Affine Date & Time: 9-14-90 (10)3				
GÉNERAL LAB INSTRUCTIONS				
Please provide the requested information				
1. Sample numbers assigned by Lab:	:toDate An	alyzed:		
2. Person performing analysis:	Data Reviewer:			
3. Scheduled sample disposal date:NOTIFY TIME OIL CO. BEFORE DISPOSAL				
4. Provide copies of ALL chromatograms, including QA/QC runs.				
IMPORTANTI PLEASE RETURN A COPY OF THIS FORM WITH YOUR REPORT TO TIME OIL CO.				
Attn: Environmental Manager, PO Box 24447 Terminal Sta., Seattle, WA 98124 (206) 285-2400				



Sample locations For Dioxin Sample shalisis
9/12/20

TOLS010774

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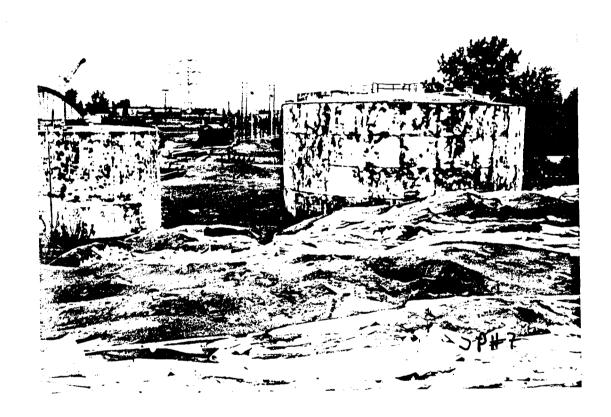














# DRAFT

# STORAGE AND CONCENTRATE DILUTION AGREEMENT

	EEMENT, made				day of	
1	9, by and	between TI	ME OIL CO	. (hereina	fter refer	red to as
"Operator"),	a corporation	incorpora	ted and e	xisting un	der the la	ws of the
State of Wash	ington and KC	PPERS COMP	ANY, INC.	(hereinaf	ter referr	ed to as
"Customer"),	a corporation	organized	and exis	ting under	the laws	of the State
of Delaware.				_		

WHEREAS, Operator is the owner of certain terminal facilities and whereas, Customer desires to obtain permission to place its hereinafter described products therein; the parties hereto agree as follows:

- 1. FACILITIES AND TERM: Operator does hereby agree to provide and Customer does hereby agree to accept certain terminal facilities and handling services, at 12005 North Burgard, Portland, Oregon as set forth in the schedule attached, and as hereinafter provided. This agreement shall be for a term of 3 years, beginning on the 1st day of May, 1983, and continuing through the 30th day of April, 1986.
- l.l Customer warrants that he has examined and inspected Operator's tanks, pipelines and equipment and the rail and truck facilities, and that Customer is fully aware of the limitations and condition thereof, and has independently concluded that said facilities are acceptable for the storage and handling of products as provided for herein. Operator reserves the right at any time or times during the term of this Agreement to substitute other suitable premises and facilities in lieu of those designated herein for the storage and handling of Customer's products upon Customer's mutual consent. Customer further warrants and represents that Customer shall be the sole legal and beneficial owner of all products at any time delivered by Customer to the tanks, warehouse or other facilities herein provided for, and that all such products shall be free from all liens and encumbrances of any nature whatsoever until such products are delivered by Operator back to Customer from Operator's facilities hereunder.
- 2. PRODUCTS STORED: Customer shall use the facilities furnished hereunder for the storage and handling of only the product specified in the schedule attached hereto. Except for products described in said schedule, Customer shall not store and/or handle or cause to be stored and/or handled in any of these facilities (a) any product containing hydrogen sulphide or other corrosive materials, (b) any product which in any way would be injurious to any of these facilities, or (c) any product which would render any of these facilities unfit, after cold water rinse cleaning, for the proper storage and/or handling of water white oils. Customer shall at its sole cost and expense be responsible for any cleaning or the repair of damages resulting from the storage and/or

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handling in any of these facilities of any product, which may not be stored and/or handled therein under the terms hereof.

- 3. <u>SERVICES PROVIDED:</u> Subject to the terms and conditions herein, Operator agrees to provide all labor and equipment necessary to receive the products specified in the attached schedule for storage and to remove them from storage for delivery as Customer may require. Provided that Operator shall not be obligated to provide equipment for receipt or delivery of products which is not already in place at the above described facility.
- 3.1 All services hereunder shall be provided as follows:
  - (a) Shipments to and from tank car and transport truck shall be performed during normal working hours; which shall be 8:00 a.m. to 4:30 p.m., Monday through Friday, holiday excepted. Tank cars and transport trucks shall be handled on a first arrival-first serve basis, but Operator is not liable for any delays or resulting damages caused thereby.
  - (b) There shall be no intra-terminal tank transfers (unless done for convenience of Operator pursuant to paragraph 1.1) and/or blending services performed by Operator other than that specifically provided for in the attached schedule.
- 3.2 Except as noted herein or in the attached schedule the services described in paragraph 3.1 shall be included in the facility fee set forth in the attached schedule, which fee shall be paid monthly in advance commencing on the first day of the term hereof unless otherwise provided in the schedule attached.
- 3.3 Should Customer require services and Operator be able to provide same at other than the hours provided above, Customer agrees to pay to Operator, in addition to the facility fee; 1) a labor charge, which shall be \$18.63 per hour for normal working hours and \$26.16 per hour for overtime hours for each such man hour worked by employees of Operator, and 2) an overhead charge calculated at 10% of the labor charge. In the event that Operator's actual labor costs, increase during the term of this contract, Operator shall have the right to adjust the above labor charge to cover those costs upon notice to Customer. The term "actual labor costs" as used in this paragraph shall include wages, overtime, contributions to Social Security, Unemployment and Workmen's Compensation, and employee benefits.
- 3.4 If this agreement is for a term greater than one year, the minimum facility fee and all other charges set forth in the attached schedule shall be adjusted annually on the anniversary date of the effective date of this agreement by multiplying the then current monthly facility fee and all other

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charges set forth in the attached schedule by a fraction of which the numerator is the U. S. Department of Labor's National Consumer Price Index for the month preceding the anniversary month and the denominator of which is the same index for the same month in the preceding year.

Operator shall perform the calculation necessary and determine any such increased fees and charges and shall notify Customer thereof. Until receipt of such notification from Operator and agreement by the Customer, Customer shall continue to pay the previously reflected monthly fees and charges. In the event that the U. S. Department of Labor's National Consumer Price Index shall have declined for any given period, the minimum facility fee and all other charges set forth in the attached schedule shall be adjusted accordingly as noted above.

If for any reason, the U. S. Department of Labor shall discontinue publication of the National Consumer Price Index during the term of this Agreement, the Operator shall give 30 days written notice to the Customer, of the use of an alternate index of changes in the general economy which would be applicable. If the Customer delivers to Operator a notice of rejection of the Operator's choice of an alternate index of changes in the general economy within 15 days from receipt by Customer of Operator's written notice thereof, both parties herein shall be bound by an index to be applied to the formula herein as determined by an independent commercial appraiser selected by both parties, with the costs of such determination to be borne equally by both parties.

- 3.5 Customer asserts no claim for the use of Operator's facilities except as expressly provided in this Agreement. Customer will use the tank car and transport truck facilities as hereinabove provided only for loading or unloading product into Operator's facilities and will not utilize said tank car or transport truck space before or beyond the period reasonably required for actual loading or unloading. All other areas are closed to Customer except when accompanied by a representative of Operator and upon Customer's execution of a Hold Harmless Agreement acceptable to Operator.
- 3.6 While on Operator's terminal premises, Customer will comply at all times with any and all rules established by Operator and with all governmental statues, ordinances, rules, regulations orders or requirements concerning air quality, water quality, or waste standards or controls imposed on or relating to the operation and use of the terminal facilities.
- 3.7 Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.

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- ACCOUNTING FOR PRODUCT: The quantity of product received into or withdrawn from storage tanks shall be determined by Operator's representatives, or at Operator's election, a licensed inspector, by checking and gauging said tanks at the time of receipt or withdrawal of said product, but not more often than once per day. Customer may participate, but in the absence of such participation, gauges taken by Operator shall be presumed to be correct, unless such gauges can be proved to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually agreed upon calibration charts of the rail car or truck tanks. In the event of any disagreement as to quantities of material received or withdrawn, the issue shall, upon written notice of either party to the other be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, with the hearing to be held in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date of the conclusion of the proceedings, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto.
- 4.1 If requested by Customer, Operator will take samples from rail tank cars, automotive tank trucks and storage tanks and make such samples available to Customer at Operator's facilities hereunder. The cost of containers for such samples and all other expenses suffered by Operator in connection with the taking and delivery of samples, shall be paid to Operator by customer each month upon receipt of invoice from Operator. Samples shall be taken in accordance with reasonable procedures specified by Customer.
- 4.2 All quantities of product delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees fahrenheit  $(60^{\circ})$  in accordance with recognized temperature correction tables. The term "barrel" whenever used herein, means 42 U. S. gallons at sixty degrees fahrenheit.
- 5. TERMINATION DUE TO GOVERNMENT REGULATION: Should the County or City, in which Operator's facilities are located, or any other Governmental entity, local or federal, prohibit operation of any then existing facilities used in performing this Agreement, or in any way deprive Operator of the right to use the modification of such facilities or the construction of additional facilities to be used in performing this Agreement, this Agreement shall terminate at the option of Operator, unless Customer shall agree in writing within 15 days after receipt of Operator's written election to terminate this Agreement to pay for the cost of replacing any such facilities or property of which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such Governmental entity, on terms acceptable to Operator.
- 6. PAYMENT AND INTEREST FEE: Customer agrees that fees and charges not paid within 30 days after presentation of Operator's invoice shall be subject to 5/6 of 1% interest charge on the outstanding invoice balance. This monthly 5/6 of 1% charge is an interest feel and is not a remedy of an item of liquidated damages. All payments hereunder shall be made to Operator at its office at

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- P. O. Box 24447, Terminal Annex, Seattle, Washington 98124 or at such other place or places as Operator may notify Customer in writing.
- DUTIES ON TERMINATION: Customer agrees upon expiration or termination of this Agreement to remove all of its material within a reasonable period of time, either bulk or packaged, from Operator's premises. All such material not removed within a reasonable period of time, shall at Operator's option become the property of Operator, and Operator may dispose of such material.
- 7.1 Customer shall be responsible for any and all costs incurred by Operator at the expiration of the term hereof in removal and disposal of material and cleaning said storage tank/tanks and the related facilities provided for hereunder, sufficient to put said tank/tanks and facilities back into clean petroleum service for unleaded products. Customer shall pay Operator immediately after presentation to Customer of invoice for all such cleaning costs. Cost for cleaning said tank/tanks and related facilities shall include, but not be limited to costs related to supplies, permits, use of equipment, labor and supervision. Tank rentals hereunder shall continue until such cleaning and disposal is accomplished.
- 7.2 LABOR DISPUTE: In the event of a labor dispute between the Customer and Customer's employees or any other third party and such labor dispute impacts or impairs the functioning and operations of Operator's facilities, the Operator has the right to immediately terminate this Agreement. Once the Agreement is terminated and notice is sent to the Customer, Customer has thirty (30) days to remove its product from Operator's facilities from receipt of notice.
- LOSSES: Operator shall not be liable for normal losses due to spillage and evaporation during normal handling of products. Operator shall not be liable for any delay or nonperformance hereunder or for evaporation, shrinkage, line loss, clingage, discoloration, contamination, bacterial action destruction of the harbor or any of the facilities referred to herein when any of the foregoing is caused in whole or in part, by any act of God or public enemy, or by labor troubles, strikes, lockouts, nonavailability of labor, riots, fires, war, storms, explosions, breakdowns or machinery, railroad embargoes or interventions, failure or delay of manufacturers or of persons from whom Operator is obtaining machinery, equipment, materials or supplies to deliver the same, or other causes beyond its control, whether such other causes be the causes herein specifically provided for or not, and whether the cause is or is not existing on the date of this Agreement. Operator shall not, in any event, be liable for loss of or damage to Customer's property, except and only when caused by Operator's failure to use reasonable care in the safekeeping and handling of Customer's property and further provide that claim is made in writing within 30 days after receipt of actual or constructive notice of any such loss or damages. It is mutually understood that the Operator is not responsible for any changes in the quality of the product stored which might occur in storage due to the possible effect of air, light, temperature or other natural or chemical happenings.

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- 8.1 Losses of any product for which Operator is responsible hereunder shall be determined annually at the end of each year, commencing with the date of the first receipt of such product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals during the period for which the accounting is made, plus the stock on hand at the end of such period, from the sum of the total receipts during such period plus the stock on hand at the beginning of such period. Normal losses shall be presumed to be 3/4 of 1% per month of receipts plus maximum amounts in storage during the period for which accounting is made and such amounts shall be deducted from any claims for losses.
- 9. <u>INSURANCE</u>: Insurance, if any be desired by Customer, shall be carried by Customer at his own expense and for the benefit of both the Customer and Operator.
- 10. DEFAULT: Should Customer default at any time in the prompt payment of any of the monies due hereunder, or in the prompt performance and observance of any of the terms, or conditions of this Agreement, and should any such default, not relating to the payment of money, continue for thirty (30) days or more after written notice thereof by Operator to Customer, or should Customer go into bankruptcy voluntary or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly fee for the whole unexpired term hereof together with all other accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement. Customer hereby grants to Operator a security interest in all products at any time contained in the tanks, warehouse or other facilities herein provided for, as security for the payment of all the fees and other charges payable to Operator by Customer hereunder, and as security also, for the payment of all other obligations of Customer to Operator, whether now in existence or hereafter contracted or incurred; and upon any such default, Operator may, after 15 days notice by Operator to Customer, sell all or any portion of such products, at public or private sale, and Operator may be purchaser at such sale or sales. Customer agrees that by execution of this agreement Customer appoints and constitutes Operator as Customer's Attorney in Fact for the sole and limited purpose of executing on behalf of the Customer a financing statement evidencing such security interest in a form satisfactory for filing with the appropriate filing officer of the State of jurisdiction over Operator's facilities. Customer shall pay and indemnify Operator against all costs and charges, including reasonable attorney's fees, incurred by Operator for the sale of Customer's products as above provided, or for enforcement of any covenant or condition herein contained on the part of Customer to be kept or performed. The remedies of Operator herein provided for shall not be exclusive, but shall be cumulative and shall be in addition to all other remedies in its favor, at law or in equity.
- 10.1 The failure by Operator at any time to enforce any default or right reserved to it, or to require performance of any of the terms, covenants, or provisions hereof by Customer at any time designated, shall not be a waiver of

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any such default or right to which Operator is entitled, nor shall it in any way affect the right of Operator to enforce such provisions thereafter.

- 11. DAMAGES: In consideration of the rates for monthly fees and other charges set forth herein (it being recognized that higher charges would be made for the limitation of liability set forth in this paragraph) it is understood and agreed that Operator shall in no event be liable for more than actual cash value or \_\_\_\_\_ cents per gallon, whichever is less, for any product loss or damage. Operator shall not be liable for special or consequential damages, no matter how such loss or damage shall have occurred or been caused. Also, it is understood that to the extent that Customer has insurance reimbursing it for losses, Customer waives any claim or claims it may have against Operator on account for such losses.
- 12. ASSIGNMENT: This Agreement shall be binding upon and inure to the benefit of the successors and assigns of each of the parties hereto; provided, however, that Customer shall not transfer or assign this Agreement, in whole or part, without the prior written consent of Operator, and any such transfer or assignment made in violation of this paragraph shall be null and void and of no force or effect whatsoever.
- 13. This Agreement is complete and contains all warranties and representations which form the basis of this Agreement. There exist no other representations or warranties unless they are enumerated herein. No amendment or modification of this Agreement shall be effective or binding unless such modification is in a written form signed by both parties hereto.
- 14. Each numbered paragraph or clause herein to this Agreement stands on its own and if any numbered paragraph or clause is held to be invalid or unenforceable, such clause shall be held separated and severable from this Agreement and the remaining Agreement shall remain in full force and effect.
- 15. If a conflict arises between the specific meaning or application of a term, clause or paragraph of the Agreement language and the accompanying schedules; the language and specific meaning of the accompanying schedules shall control and be followed.
- 16. NOTICES: All notices from one party to the other shall be directed to the appropriate address below or such other address or addresses as either party shall notify the other in writing:

OPERATOR: Time Oil Co.

P. O. Box 24447, Terminal Annex, Seattle, WA 98124

CUSTOMER: Koppers Company, Inc.

5317 Southwest Avenue, St. Louis, Mo 63110

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IN WITNESS WHEREOF, this Agreement has been made and executed by the parties hereto as of the day, month and year first hereinabove written.

Attest:	OPERATOR: TIME OIL CO.
Secretary	By: its
	CUSTOMER: KOPPERS COMPANY, INC
	Ву:
Secretary	its

# SCHEDULE TO STORAGE AND CONCENTRATE DILUTION AGREEMENT

DATE

TERMINAL:

12005 North Burgard, Portland, Oregon

CUSTOMER:

Koppers Company, Inc.

COMMODITIES

TO BE STORED:

Woodtox Concentrate, wax, mineral spirits for wood preservatives and the finished products for wood

preservatives.

TERM:

3 years

STORAGE TANKS:

Mineral Spirits 38009
Woodtox Concentrate T-1-7 20001
Woodtox Preprime RTU 13001

Koppers - 3 - 8,000 1 - 6,000 1 - 3,000

FACILITY FEE:

\$700/month

ADDITIONAL CHARGES:

\$0.0500 per gallon for each gallon Woodtox Concentrate T-1-7 received in railcar. This includes adding the wax and mineral spirits to make Woodtox Preprime RTU.

\$0.0036 per gallon - bulk T/T loading of Woodtox

Preprime RTU.

\$0.0730 per gallon - drum filling of Woodtox Preprime

RTU.

\$0.7500 per drum in and \$0.7500 per drum out for prepackaged finish goods products produced by Koppers.

SPECIAL PROVISIONS:

Operator shall blend or mix the above referenced products at temperatures not to exceed 180°F.

Mineral Spirits - for resale - \$0.0300 per gallon -

total thru put charge.

## STORAGE AND LICENSE AGREEMENT

THIS AGREEMENT, made and entered into this day of
19, by and between TIME OIL CO. (hereinafter referred to as
"Operator"), a corporation incorporated and existing under the laws of the
State of Washington and KOPPERS COMPANY, INC. (hereinafter referred to as
"Customer"), a corporation organized and existing under the laws of the State of Delaware.

WHEREAS, Operator is the owner of certain terminal storage facilities and whereas, Customer desires to obtain permission to place its hereinafter described products therein; the parties hereto agree as follows:

١.	FACIL:	<u>ITIES AND</u>	TERM:	Operator	does h	ereby a	gree to	provide	and Cu	ıstomer
does	hereby	agree to	accept	certain :	termina	1 stora	ge faci	lities an	id hand	iling
servi	ces, at	t 12005 N	orth Bui	rgard, Po	rtland,	Oregon	as set	forth in	the	
				hereina						i be
for a	term o	of 3 year	s, begir	ining on i	the	day	of			<b></b> ,
				igh the _					_, 19_	·

- 1.1 Customer warrants that he has examined and inspected Operator's tanks, pipelines and equipment and the dock, rail and truck facilities, and that Customer is fully aware of the limitations and condition thereof, and has independently concluded that said facilities are acceptable for the storage and handling of products as provided for herein. Operator reserves the right at any time or times during the term of this Agreement to substitute other suitable premises and facilities in lieu of those designated herein for the storage and handling of Customer's products. Customer further warrants and represents that Customer shall be the sole legal and beneficial owner of all products at any time delivered by Customer to the tanks, warehouse or other facilities herein provided for, and that all such products shall be free from all liens and encumbrances of any nature whatsoever until such products are delivered by Operator back to Customer from Operator's facilities hereunder.
- 2. PRODUCTS STORED: Customer shall use the facilities furnished hereunder for the storage and handling of only the products specified in the schedule attached hereto. Except for products described in said schedule. Customer shall not store and/or handle or cause to be stored and/or handled in any of these facilities (a) any product containing hydrogen sulphide or other corrosive materials. (b) any product which in any way would be injurious to any of these facilities, or (c) any product which would render any of these facilities unfit, after cold water rinse cleaning, for the proper storage and/or handling of water white oils. Customer shall at its sole cost and expense be responsible for any cleaning or the repair of damages resulting from the storage and/or handling in any of these facilities of any product, which may not be stored and/or handled therein under the terms hereof. Others possible
- 3. <u>SERVICES PROVIDED</u>: Subject to the terms and conditions herein, Operator agrees to provide all labor and equipment necessary to receive the products specified in the attached schedule(s) for storage and to remove them from storage for delivery as Customer may require. Provided that Operator shall not be obligated to provide equipment for receipt or delivery of products which is not already in place at the above described facility.
- 3.1 All services hereunder shall be provided as follows:
  - (a) Shipments to and from tank car and transport truck shall be performed during normal working hours; which shall be 8:00 a.m. to 4:30 p.m., Monday through friday, holidays excepted. Tank cars and transport trucks shall be handled on a first arrival-first serve basis.

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- (b) There shall be no intra-terminal tank transfers, (unless done for convenience of Operator pursuant to paragraph 1.1) and/or blending services performed by Operator other than that specifically provided for in the attached schedule.
- 3.2 Except as noted herein or in the attached schedule the services described in paragraph 3.1 shall be included in the minimum service fee set forth in the attached schedule, which fee shall be paid monthly in advance commencing on the first day of the term hereof unless otherwise provided in the schedule attached.
- 3.3 Only if Customer requests services in writing and Operator be able to provide same at other than the hours provided above, Customer agrees to pay to Operator, in addition to the minimum service fee; 1) a labor charge, which shall be \$18.63 per hour for normal working hours and \$26.16 per hour for overtime hours for each such man hour worked by employees of Operator, and 2) an overhead charge calculated at 10% of the labor charge. In the event that Operator's actual labor costs, increase during the term of this contract, Operator shall have the right to adjust the above labor charge to cover those costs upon notice to Customer. The term "actual labor costs" as used in this paragraph shall include wages, overtime, contributions to Social Security, Unemployment and Workmen's Compensation, and employee benefits.
- 3.4 If this agreement is for a term greater than one year, the minimum service fee and all other charges set forth in the attached schedule(s) sha'l be adjusted annually on the anniversary date of the effective date of this agreement by multiplying the then current monthly rental fees and all other charges set forth in the attached schedule(s) by a fraction of which the numerator is the U.S. Department of Labor's National Consumer Price Index for the month preceding the anniversary month and the denominator of which is the same index for the same month in the preceding year.

Operator shall perform the calculation necessary and determine any such increased fees and charges and shall notify Customer thereof. Until receipt of such notification from Operator, Customer shall continue to pay the previously reflected monthly fees and charges and shall pay any excess upon later notification provided that Operator notifies Customer of any changes within 30 days of the effective date of such change. In the event that the U.S. Department of Labor's National Consumer Price Index shall have declined for any given period, the minimum service fee and all other charges set forth in the attached schedule(s) shall be the same fees and charges as for that preceding month.

If for any reason, the U.S. Department of Labor shall discontinue publication of the National Consumer Price Index during the term of this Agreement, the Operator shall give 30 days written notice to the Customer, of the use of an alternate index of changes in the general economy which would be applicable. If the Customer delivers to Operator a notice of rejection of the Operator's choice of an alternate index of changes in the general economy within 15 days from receipt by Customer of Operator's written notice thereof, both parties herein shall be bound by an index to be applied to the formula herein as determined by an independent commercial appraiser selected by both parties, with the costs of such determination to be borne equally by both parties.

3.5 Customer asserts no claim for the use of Operator's facilities except as expressly provided in this Agreement. Customer will use the tank car and transport truck facilities as hereinabove provided only for loading or unloading product into Operator's facilities and will not utilize said tank car or transport truck space before or beyond the period reasonably required for actual loading or unloading. All other areas are closed to Customer except when accompanied by a representative of Operator and upon Customer's execution of a Hold Harmless Agreement acceptable to Operator.



- 3.6 While on Operator's terminal premises, Customer shall comply at all times with any and all rules established by Operator and with all governmental statutes, ordinances, rules, regulations orders or requirements concerning air quality, water quality, or waste standards or controls imposed on or relating to the operation and use of the terminal facilities.
- 3.7 Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.
- ACCOUNTING FOR PRODUCT: The quantity of product received into or withdrawn from storage tanks shall be determined by Operator's representatives, or at Operator's election, a licensed inspector, by checking and gauging said tanks at the time of receipt or withdrawal of said product, but not more often than once per day. Customer may participate, but in the absence of such participation, gauges taken by Operator shall be presumed to be correct, unless such gauges can be proved to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually agreed upon calibration charts of the rail car or truck tanks. In the event of any disagreement as to quantities of material received or withdrawn, the issue shall, upon written notice of either party to the other be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, with the hearing to be held in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date of the conclusion of the proceedings, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto.
- 4.1 If requested by Customer, Operator will take samples from ships, barges, rail tank cars, automotive tank trucks and storage tanks and make such samples available to Customer at Operator's facilities hereunder. The cost of containers for such samples and all other expenses suffered by Operator in connection with the taking and delivery of samples, shall be paid to Operator by Customer each month upon receipt of invoice from Operator. Samples shall be taken in accordance with reasonable procedures specified by Customer.
- 4.2 All quantities of product delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees fahrenheit  $(60^{\circ})$  in accordance with recognized temperature correction tables. The term "barrel" whenever used herein, means 42 U.S. gallons at sixty degrees fahrenheit.
- 5. TERMINATION DUE TO GOVERNMENT REGULATION: Should the County or City, in which Operator's facilities are located, or any other Governmental entity, local or federal, prohibit operation of any then existing facilities used in performing this Agreement, or in any way deprive Operator of the right to use any such facilities or provide services in connection therewith, or require the modification of such facilities or the construction of additional facilities to be used in performing this Agreement, this Agreement shall terminate at the option of Operator, unless Customer shall agree in writing within 30 days after receipt of Operator's written election to terminate this Agreement to pay for the cost of replacing any such facilities or property of which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such Governmental entity, on terms acceptable to Operator.
  - 6. PAYMENT AND INTEREST FEE: Customer agrees that fees and charges not paid within (30) days after presentation of Operator's invoice shall be subject to 5/6 of 1% interest charge on the outstanding invoice balance. This monthly 5/6 of 1% charge is an interest fee and is not a remedy or an item of liquidated damages. All payments hereunder shall be made to Operator at its office at P.O. Box 24447, Terminal Annex, Seattle, Washington 98124 or at such other place or places as Operator may notify Customer in writing.

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- 7. <u>DUTIES ON TERMINATION</u>: Customer agrees that upon expiration or termination of this Agreement it shall remove all of its material, either bulk or packaged, from Operator's premises within 26 days and shall continue to pay the minimum service fee for any period during which the product remains on Operator's premises. All such material not removed at the expiration of such Operator may dispose of such material.
  - 7.1 Customer shall be responsible for any and all costs incurred by Operator at the expiration of the term hereof in removal and disposal of material and cleaning said storage tank/tanks and the related facilities provided for hereunder, sufficient to put said tank/tanks and facilities back into clean petroleum service for unleaded products. Customer shall pay Operator immediately after presentation to Customer of invoice for all such cleaning costs. Cost for cleaning said tank/tanks and related facilities shall include, but not be limited to costs related to supplies, permits, use of equipment, labor and supervision. Tank rentals hereunder shall continue until such cleaning and disposal is accomplished.
  - 7.2 <u>LABOR DISPUTE</u>: In the event of a labor dispute between the Customer and Customer's employees or any other third party and such labor dispute impacts or impairs the functioning and operations of Operator's facilities, the Operator has the right to immediately terminate this Agreement. Once the Agreement is terminated and notice is sent to the Customer, Customer has thirty (30) days to remove its product from Operator's facilities from receipt of notice.
- Termination Clauses
  - LOSSES: Operator shall not be liable for normal losses due to evaporation during normal handling of products. Operator shall not be liable for any delay or nonperformance hereunder or for evaporation, shrinkage, line loss, clingage, discoloration, contamination, bacterial action damage to or destruction of the harbor or any of the facilities referred to herein when any of the foregoing is caused in whole or in part, by any act of God or public enemy, or by labor troubles, strikes, lockouts, nonavailability of labor, riots, fires, war, storms, explosions, breakdowns or machinery, railroad embargoes or interventions, failure or delay of manufacturers or of persons from whom Operator is obtaining machinery, equipment, materials or supplies to deliver the same, or other causes beyond its control, whether such other causes be the causes herein specifically provided for or not, and whether the cause is or is not existing on the date of this Agreement. Operator shall not, in any event, be liable for loss of or damage to Customer's property, except and only when caused by Operator's failure to use reasonable care in the safekeeping and handling of Customer's property and further provided that claim is made in writing within 30 days after receipt of actual or constructive notice of any such loss or damages. It is mutually understood that the Operator is not responsible for any changes in the quality of the product stored which might occur in storage due to the possible effect of air, light, temperature or other natural or chemical happenings.
  - 8.1 Losses of any product for which Operator is responsible hereunder shall be determined annually at the end of each year, commencing with the date of the first receipt of such product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals during the period for which the accounting is made, plus the stock on hand at the end of such period, from the sum of the total receipts during such period plus the stock on hand at the beginning of such period. Normal losses shall be presumed to be 3/4 of 1% per month of receipts plus maximum amounts in storage during the period for which accounting is made and such amounts shall be deduted from any claims for losses.
  - INSURANCE: Insurance, if any be desired by Customer, shall be carried by Customer at his own expense.

- DEFAULT: Should Customer default at any time in the prompt payment of any of the monies due hereunder, or in the prompt performance and observance of any of the terms, or conditions of this License Agreement, and should any such default, not relating to the payment of money, continue for thirty (30) days or more after written notice thereof by Operator to Customer, or should Customer go into bankruptcy voluntary or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly fee for the whole unexpired term hereof together with all other accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement. Customer hereby grants to Operator a security interest in all products at any time contained in the tanks. warehouse or other facilities herein provided for, as security for the payment of all the fees and other charges payable to Operator by Customer hereunder, and as security also, for the payment of all other obligations of Customer to Operator, whether now in existence or hereafter contracted or incurred; and upon any such default, Operator may, after 15 days notice by Operator to Customer, sell all or any portion of such products, at public or private sale, and Operator may be purchaser at such sale or sales. Customer agrees that by execution of this agreement Customer appoints and constitutes Operator as Customer's Attorney in Fact for the sole and limited purpose of executing on behalf of the Customer a financing statement evidencing such security interest in a form satisfactory for filing with the appropriate filing officer of the State of jurisdiction over Operator's facilities. Customer shall pay and indemnify Operator against all costs and charges, including reasonable attorney's fees, incurred by Operator for the sale of Customer's products as above provided, or for enforcement of any covenant or condition herein contained on the part of Customer to be kept or performed. The remedies of Operator herein provided for shall not be exclusive, but shall be cumulative and shall be in addition to all other remedies in its favor, at law or in equity.
- 10.1 The failure by either party hereto at any time to enforce any default or right reserved to it, or to require performance of any of the terms, covenants, or provisions hereof by the other at any time designated, shall not be a waiver of any such default or right to which such party is entitled, nor shall it in any way affect the right of such party to enforce such provisions thereafter.
- 11. <u>DAMAGES</u>: In consideration of the rates for monthly fees and other charges set forth herein (it being recognized that higher charges would be made but for the limitation of liability set forth in this paragraph) it is understood and agreed that Operator shall in no event be liable for more than actual cash value <u>er\_\_\_\_cents per gallon, whichever is less</u>, for any product loss or damage. Operator shall not be liable for special or consequential damages, no matter how such loss or damage shall have occurred or been caused.
- 12. <u>ASSIGNMENT</u>: This Agreement shall be binding upon and inure to the benefit of the successors and assigns of each of the parties hereto; provided however, that Customer shall not transfer or assign this Agreement, in whole or part, without the prior written consent of Operator which consent shall not be unreasonably withheld, and any such transfer or assignment made in violation of this paragraph shall be null and void and of no force or effect whatsoever.
- 13. <u>COMPLETE AGREEMENT</u>: This Agreement is complete and contains all warranties and representations which form the basis of this Agreement. There exist no other representations or warranties unless they are enumerated herein. No amendment or modification of this Agreement shall be effective or binding unless such modification is in a written form signed by both parties hereto.

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- 14. <u>SEVERABILITY</u>: Each numbered paragraph or clause herein to this Agreement stands on its own and if any numbered paragraph or clause is held to be invalid or unenforceable, such clause shall be held separated and severable from this Agreement and the remaining Agreement shall remain in full force and effect.
- 15. <u>CONFLICTS</u>: If a conflict arises between the specific meaning or application of a term, clause or paragraph of the Agreement language and the accompanying schedules; the language and specific meaning of the accompanying schedules shall control and be followed.
- 16. <u>NOTICES</u>: All notices from one party to the other shall be directed to the appropriate address below or such other address or addresses as either party shall notify the other in writing:

OPERATOR: Time 011 Co.
P.O. Box 24447, Terminal Annex, Seattle, WA 98124

CUSTOMER: Wood Treating Chemicals Co.
5137 Southwest Avenue, St. Louis, MO 63110

IN WITNESS WHEREOF, this Agreement has been made and executed by the parties hereto as of the day, month and year first hereinabove written.

Attest:	OPERATOR: TIME OIL CO.
Secretary	By:
	CUSTOMER: KOPPERS COMPANY, INC.
Secretary	

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## SCHEDULE TO STORAGE AND LICENSE AGREEMENT DATED

TERMINAL:

12005 North Burgard, Portland, Oregon

CUSTOMER:

Koppers Company, Inc.

COMMODITIES

TO BE STORED:

Woodtox Concentrate, wax, mineral spirits for wood preservatives and the finished products for wood

preservatives.

TERM:

3 years

STORAGE TANKS:

Mineral Spirts Woodtox Concentrate T-1-7

38009 - 30,000 GDL - EK 2000 - ادر مصوملا - اكاد

Woodtox Preprime RTU Mix Tank 🗲

13001

- Keme(?) Koppers -3 - 8,0001 - 6,0001 - 3,000

MINIMUM STORAGE FEE: 1500.00 (?) - Revent to Electe upon.

- VERSUS ★ <u>700</u>8(?)

ADDITIONAL CHARGES: \$0.0500 per gallon for each gallon of Woodtox Concentrate

1-1-7 received in railcar. This includes adding the wax and mineral spirits to make Woodtox Preprime RTU. All blending is to be in accordance with Koppers specifications, which have been provided to the Operator.

619183war various with Drues+

\$0.0036 per gallon - bulk T/T loading of Woodtox Preprime RTU.

\$0.0730 per gallon - drum filling of Woodtox Preprime RTU.

\$0.7500 per drum in and \$0.7500 per drum out for prepackaged finish goods products produced by Koppers.

Mineral Spirits - \$0.0300 per gallon - total thru put charge, Covers unleading from rail cars and releading ento trucks for shipment measured at the on trucks for shipment. D CT 40

SPECIAL PROVISIONS:

Operator shall blend or mix the above referenced products

at temperatures not to exceed  $180^{\circ}$  F.

FOLLOW UP MADE FOR OPTION TO CANCELL PRIOR TO MARCH 31, 1981.

#### AGREEMENT

THIS AGRETHMENT, made and entered into this lot day of March, 1967, by and between TIPE OIL CO. (hereinafter referred to as "Operator"), a corporation incorporated and existing under the laws of the State of Washington, and WOOD TREATING CHEMICALS CO. (hereinafter referred to as "Customer"), a corporation organized and existing under the laws of the State of Missouri.

#### WITHESSETH:

For and in consideration of the mutual covenants and conditions contained herein, it is agreed as follows:

#### A. FACILITIES.

- 1. Operator shall provide and furnish to Customer during the term of this Agreement facilities, storage tanks, blending tanks, againment, improvements and varehouse space as set forth in the Schedule attached hereto and as set forth in this Agreement (all hereinefter called "Facilities").
- 2. Operator shall retain possession of the Facilities and shall keep and maintain the same in good order and repair and clean and fit for the storage and handling of the Products. Customer shall have the right to inspect the Facilities and the Products stored therein at all times during the hereinafter defined Regular Hours, and during other reasonable times, but no such inspection shall relieve Operator of any of its obligations under this Agreement. Operator shall advise Customer in writing in advance of any changes or alterations in or to the Facilities (excluding, however, maintenance and repairs) which are used for the receipt, storage, blending, handling or redelivery of the Products.

# B. SERVICES.

1. Operator shall provide and furnish to Customer during the term of this Agreement any and all labor and services necessary or reasonably incidental to receive, store, handle, blend and redeliver the Products at, to and from the Facilities in a sefe, efficient, clean and prompt manner (all hereinsfiter called the "Services").

- 2. Operator shall receive the Products from trucks and rail cars, store the same in the storage tanks, transfer such Products to the blending tanks as directed by Customer, and redeliver such Products into trucks and rail cars, as and when directed by Customer. Operator shall follow the procedures cutlined in the booklet entitled "Monsanto Warehousing and Terminaling Unified Procedures" and all reasonable amendments thereof and additions thereto, applicable to the Products involved. A copy of such booklet is attached hereto as Exhibit A and made a part hereof. Operator shall keep complete and accurate records of the type and quantity of the Products received into, transferred out. Of, and remaining in said Facilities at all times and of all shipments of the Products made at Customer's request, and such records shall be open to inspection by Customer at all reasonable times. Operator shall make reports to Customer with respect to such receipts, shipments and inventories, at such times and in such manner as may be reasonably prescribed by Customer.
- 3. The Services shall be performed from 7:00 a.m. to 4:30 p.m., five days per week, Monday through Friday, except for the holidays hereinafter mentioned, herein called the "Regular Hours." The holidays are New Year's Day, Hemorial Duy, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day and Christmas. Upon the request of Customer, Operator shall perform such services beyond Regular Hours at an additional charge of \$425 per man hour.
- C. PAYMENTI. So long as Operator shall meet its obligations hereunder, Customer shall make payments to Operator during the term of this Agreement according to the Charges on the attached Schedule.

## D. GENERAL.

- 1. Neither Operator, nor any person or party claiming by, through or under Operator, shall ever have or assert any right, title, claim, lies or interest in or to any of the Products.
- 2. In no event, anything in this Agreement to the contrary notwithstanding, does Operator intend to lease, sublease or assign to the Customer all or any part of the Facilities referred to herein, and neither this Agreement, nor any provision thereof, shall be so construed.

- 3. Operator shall indemnify and hold harmless Customer from and against any and all liabilities, claims, actions, damages, losses, costs or expenses arising out of injury to or death of any person or damage to or loss or destruction of any property, caused by or connected with: (a) any negligence, or wrongful act or omission of Operator, its amployees or agents in the receipt, storage, handling or redelivery of the Products, or any of them; (b) the performance or nonperformance of any of its obligations or operations under this Agreement; or (c) any default of Operator hereunder.
- 4. Operator shall obtain and maintain, at its expense, during the term of this Agreement, the following insurance in insurance companies satisfactory to Customer:
  - (a) Workmen's compensation insurance in an amount equal to the limit of liability and in the form prescribed by the laws of Oregon, for all Operator's employees engaged in any operations under this Agraement. In the event that any employees are not protected by a workmen's compensation statute, Operator shall provide employer's liability insurance in an amount not less than \$100,000 for injury to or for death of any one employee, and subject to the same limitation for each employee, in an amount not less than \$300,000 on account of any one accident.
  - (b) Public liability insurance sufficient to cover the obligations assumed by Operator pursuant to Section D.3 of this Agreement and claims for injury to or death of persons or damage to property arising from any activities or operations of Operator under this Agreement in amounts of:
    - (i) not less than \$150,000 for injury to or death of any one person and not less than \$500,000 in respect to any one accident; and
    - (ii) not less than \$100,000 for damage to or destruction of property on account of each accident.

Operator small furnish Customer with certificates of insurance which certificates shall provide that the foregoing insurance coverage shall not be terminated or reduced without the insurance carrier first giving Customer ten (10) days prior written notice thereof.

- 5. Operator shall be liable and responsible for any loss, destruction, spoilage, spillage, pollution, evaporation, shrinkage, line-loss, clingage, discoloration or contamination of, or damage to, any Products arising out of its receipt, storage, handling, blending, mixing or redelivery thereof, or of any of the Services performed or to be performed hereunder resulting from the negligence or wrongful act or omission of Operator, its employees, agents or representatives, or default of Operator under this Agreement.
- damaged or destroyed or become unfit by reason of fire, explosion, accident, casualty or any other similar cause, or if any of the Facilities are taken or condemned by eminent domain proceedings (all of the foregoing being hereinafter for somewhere ecoleratively salled "Casualty") so that the same shall be randered unsuitable or unavailable for the receipt, storage, handling and redelivery of any of the Products, Operator shall immediately notify Customer thereof. Not later than ten (10) days after the occurrence of such Casualty, Operator shall also notify Customer as to whether the Facilities will be restored to their former condition within a period of time not longer than six (6) months measured from the date of such Casualty. If such notice is not given, or if given and the Facilities are not restored by the end of said six (6) month period, Customer may terminate this Agreement at any time thereafter upon notice to Operator, and thereupon Customer shall be relieved of all duties and obligations hereunder.
  - 7. (a) Losses of any Product for which Operator is responsible hereunder shall be determined monthly at the end of each month, dommenoing with the date of the first receipt of such Froduct by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals of such Product during the period for which the accounting

- is made, plus the stock of such Product on hand at the end of such period, from the sum of the total receipts of such Product during such period plus the stock of such Product on hand at the beginning of such period.
- (b) Operator shall not be liable for actual losses resulting from normal spillage and evaporation not in excess of the loss allowance hereinafter described. The term "loss allowance" shall mean actual losses resulting from normal spillage and evaporation not exceeding 3/4 of 1% per month of the aggregate of the receipts per month or 3/4 of 1% of the maximum amount of Products stored in any one month, whichever is greater, of any such Product as determined under Section D.9(b) of this Agreement.
- S. While on Operator's terminal premises, Customer shall comply at all times with any and all rules established as of the date of this Agreement by Operator in connection with the operation of the terminal. A copy of such rules is attached hereto as Exhibit B to this Agreement. Such rules shall not hereafter be smended except by consent of Customer.

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9. (a) If the average wage rate in effect at the terminal for all employees of Operator employed full or part time at the terminal as of the first day of any month shall exceed \$2.71 per hour, then, with respect to such month, the handling and trunsfer charges set forth in the schedule(s) shall be increased by a percentage equal to 25 per cent (25%) of that percentage of \$2.71 which the excess of the average wage rate of \$2.71 constitutes. "Average wage rate" means the amount derived by dividing (a) the total of (1) the rates for the single-rate classifications of wage rates applicable to Operator's personnel and (11) the mid-points or wage rates for all rate-range classifications applicable to Operator's personnel by (b) the

- number of classifications applicable to Operator's personnel.
- (b) The quantity of Product received into or withdrawn from storage tanks shall be determined by Operator's representatives by checking and gauging said tanks at the time of receipt or withdrawal of said Product. Customer may assist, supervise, or participate in all aspects of such checking and gauging, but in the absence of such participation, gauges taken by Operator shall be conclusive, unless such gauges are proven to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually acceptable calibration charts of the rail car or truck tunks. The cost of such work done by Operator's representatives or licensed inspectors shall be borne by Customer. In the event of any disagramment as to quantities of Products received, it shall, upon written notice of either party to the other, be submitted to one arbitrator to be appointed by the American Arbitration Association for bearing and decision, in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date the case is submitted, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto and the law of Missouri shall govern the arbitration and award.
- (c) If requested by Customer, Operator will take samples from rail tank cars, automotive tank trucks and storage tanks and deliver such samples to Customer and the cost of containers for such samples paid by Operator and the freight charges for deliveries thereof to Customer shall be reimbursed to Operator by Customer each month. Samples shall be taken in accordance with the procedure specified by Customer.

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(d) All quantities of Iroduct delivered to or shipped from the terminal shall be calculated in mallons at sixty degrees Fahrenheit (60°F) in accordance with recognized temperature correction tables.

The term "parrol" whenever used horein, means

(Next para raph number 10 on following page #7)

- 10. Without relieving Operator from any of its duties or bbligations under this Agreement, for each day or portion thereof that:
  - (a) The Facilities are unsuitable for the receipt, storage, blending, handling or redelivery of any of the Products by reason of any Casualty or for any other similar or dissimilar reason, and/or
  - (b) Operator fails or refuses to provide and furnish the Services.

them, and in either event, the Charges set forth in the Schedule shall be suspended for such period or periods; furthermore, if Operator fails or refuses to redeliver any of the Products within five (5) days after Customer's request therefor, Customer shall have the right to enter upon the Facilities and remove such Products from the storage area.

- 11. Customer agrees to examine Operator's tanks, pipelines and equipment prior to Customer's acceptance and use of their Facilities berounder and by such use agrees that said Facilities are acceptable for rendering of the Services referred to herein. Operator may substitute other suitable facilities in lieu of those which are designated hereunder provided Operator pays any costs incurred by Customer in regard to such substitution.
- the storage, blending and handling of only the Products and commodities specified in said Schedule; provided, however, that anything in this Agreement to the contrary notwithstanding, Customer shall not store and/or handle or cause to be stored and/or handled in any of these Facilities (a) any commodity other than those listed on such Schedule containing hydrogen sulphide or other corresive materials, (b) any commodity other than those listed on such Schedule which would in any way be injurious to any of the Facilities, or (c) any commodity other than those listed on such Schedule which would render any of the Facilities unfit, after cleaning, for the proper storage and/or handling of vater white oils.

  Customer shall be responsible for any damages resulting from the storage and/or handling in any of these Facilities of any commodity other than those listed in the Schedule which may not be stored and/or handled therein under the terms hereof.

13. (a

Subject to the terms of Sections 5 and 10 hereaf, neither party small be liable to the other for, and each shall be excused from, any failure of or delay in performance under this wereasent, caused by any acts of the or the public enemy, war, floods, storms, earthquake, lightning, or other act of the elements, recidental fires, explosion, strikes, labor disturbances, riots, insurrection, civil commotion, Fovernmental acts or regulations, accidents, failure or delay of transportation or delivery facilities or sugglies, failure or delay of manufacturers or persons from whom such party is obtaining machinery, equipment, emberials or supplies to deliver the same, or any other cause beyond the control and without the fault or not look of such party, whether similar or not to the forcemin, capena. For each day or portion thereof that elther party stall Call or be use to perfore by reason of any of the Commoding evenue, the said charmed set forth in the Schedule shall be a spended for such period or periods. Each party shall, in the event it shall fail or be unable to perform by reason of any of the foregoing events, cromptly noticy the other party thereof. Upon consation of any cush event, performance shall be resumed promptly and the other party shall be notified immediately thereof. Should the County or City, in which Operator's Facilities are located, or any other government agency, local or federal, premittit operation of any thom existing Pacilities nised in performing this Apresent, or shall in any way decrive Orecat r of the right to use any such facilities. or any emperty in connection therewith, or shall require. the construction of additional facilities to be used in performing this Agreement, this Agreement small terminate at the option of operator, unless Juplemen shall pay for the cost of replacing any such Facilities or property of

which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such government agency.

(c) The cost of any Armed Quard Services and/or other protective services or facilities required by Customer or by any government agency shall be for the account of Customer.

lh. Operator shall bill Customer monthly in advance and Customer agrees to pay Operator within 10 days after presentation of invoice. All payments hereunder shall be made to Operator at its office at 12005 N. Burgard St., P. O. Box 03117, Portland, Ore on 97203, or at such other place as Operator may notify Customer in writing.

15. Customer agrees promptly upon expiration or termination of this Agreement, to remove all of its Products, either bulk or packaged, from Operator's premises. All such Products not removed within 60 days after the expiration or termination of this Agreement may be sold at auction by Operator and Operator shall return to Customer the proceeds of any such sale, less the amount oned Operator by Customer under the terms of this Agreement and Operator's reasonable expenses in selling said Products.

of April 1, 1967 and, if not carlier terminated as herein provided, shall end on March 31, 1972. Upon the expiration of the initial term of this Agreement, this Agreement shall be automatically renewed for a term of five years, and automatically renewed thereafter for successive terms of five years each; provided, however, that either party, at its option, shall have the right to terminate this Agreement at the end of its initial term or at the end of any renewal term by furnishing written notice to the other party at least one year prior to the designated termination date.

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- 16. (b) Provided that Customer may, at its option; terminate this Agreement at any time during the initial term of this Agreement by making a payment to Operator which is equal to Operator's total expenditures for storage, blending tunks, heating elements, warehouse improvements or improvements to any such Facilities which were expended by Operator for the purpose of furnishing storage or blending tanks and Facilities to Customer, less 20% of the total expenditures for each full year that this Agreement has been in full force and effect.

  represents
  The Operator/that the amount expended covering the above is \$6230.00-
  - (c) Should Operator fail or refuse to discharge any of its obligations under this Agreement, Customer may, at its option and in addition to any other remedies provided for herein, terminate this Agreement immediately upon giving notice to Operator.
- or be placed in the hands of a receiver, State of Federal, then, and in any such event, the minimum monthly storage and handling charges for the whole unexpired term hereof together with all accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement and, after giving 15 days' notice to Customer, Operator may sell all or any portion of such Products, at' public or private sale, but Operator may not be purchaser at such sale or sales. Customer shall pay for and indemnify Operator against its reasonable expenses of such sale, including reasonable attorney's fees, incurred by Operator for the sale of Customer's Products as above provided, for storage, handling services or other amounts due and owing Operator. Any proceeds of such sale less any amounts due and owing ffom Customer to Operator under this Agreement and the reasonable expenses of such sale, shall be promptly remitted by Operator to Customer.

- eliminate the handling, blending or storage of any of the Products so that the Facilities are not used or required, Operator shall, at Customer's request, use all reasonable efforts, and otherwise cooperate with Customer, to find and make arrangements with another party or parties to utilize such unused or unrequired Facilities to the extent and as designated by Customer, Operator shall, however, have the right to establish reasonable fees and charges in connection with such arrangements. Customer shall be entitled to a credit against all fees (but not exceeding any amounts due from Customer) to the extent of payments made by such other party or parties pursuant to said arrangements.
- 19. Customer shall pay any and all taxes, charges and/or assessments on or with respect to the Products. Operator shall pay any and all taxes, charges and/or assessments on or with respect to the Facilities and/or Services.
- 20. Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator berounder or the names of customers to whom delivery of such Products or other products is scheduled or made.
- 21. Operator is not and shall not act or purport to not as an amployee, agent or representative of Customer, but is and shall act as an independent contractor.
- 22. Operator shall obtain and maintain all legally required state and local licenses and permits required for construction, maintenance or operation of the Pacilities and/or the Services or Operator's performance of this Agreement.
- 23. Operator agrees to assume liability for any demurrage on rail\*equipment or truck equipment, which occurs directly as a result of Operator's operations. Any demurrage accruing on rail equipment or truck equipment, through no fault of Operator shall be paid by Customer; provided, however, Operator shall, in good faith, furnish Customer with all evidence and information known to Operator with respect to the facts, circumstances and causes connected with rail or truck demurrage.

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24. Except for any transfer or assignment, in whole or in part by Customer to the Monsanto Company or to any subsidiary company in which Customer owns or controls at least a 50% interest or to an associated company in which the Monsanto Company owns or controls at least a 50% interest, neither party shall transfer or assign this Agreement, or any of its rights bereunder, in whole or in part, without the prior written consent of the other party, and any attempt to do so without such consent shall be void. Subject to the foregoing, this Agreement shall inure to the benefit of and be binding upon the parties bereto and their respective successors and assigns.

25. Except as otherwise provided in this Agreement, any notice required or permitted to be given under this Agreement shall be in writing and shall be sufficiently given when delivered in person or when deposited in the United States cails (registered or certified), postage prepaid, addressed as follows:

If to Operator, addressed to:

Time Oil Co. 5150 Wilshire Boulevard Los Angeles, California 90036

and a copy to:

12005 N. Burgard Street P. O. Box 03117 Portland, Oregon 97203

If to Customer, addressed to:

Wood Treating Chemicals Co. 5137 Southwest Avenue St. Louis, Mo. 63110 Attn: R. M. Morriss. Jr.

or to such other address as may be specified from time to time in a written notice given by such party. Both parties agree to acknowledge in writing receipt of any notice delivered in person. Routins operating instructions, requests, a directions and other similar routine communications shall not require a notice as above provided and may be given in such manner and to such persons as may be customary or practicable.

26. This Agraement constitutes the sole agraement between the parties pertaining to the Facilities and/or Services.

27. The section and paragraph headings in this Agreement are inserted for convenience only and are in no way to be construed as part of this Agreement or as a limitation of the scope of the particular sections or paragraphs to which they refer.

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the day and year first hereinabove written.

TIME OIL CO.

#### SCHEDULE

TERMINAL:

TIME OIL CO., Portland, Oregon.

DATE OF

ACREEMENT:

March 1, 1967.

INITIAL TERM OF

TERM OF AGREEMENT:

April 1, 1967 to March 31, 1972.

OPERATOR:

TIME OIL CO.

CUSTOMER:

WOOD TREATING CHEMICALS CO.

PRODUCTS TO

BE STORED:

Mineral spirits with additives.

FACILITIES:

Operator will furnish Customer the following Facilities:

Storage Tanks:

Three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 107,000 pounds of additives on pallots in drums and bags. Additives being pentchlorophonol in bags and Gustomer's additive #316 in drums.

#### STRVICES:

Storage and handling:

Operator shall receive the Products from tank cars and/or transport trucks and shall deliver such Products into storage tanks.

Operator shall deliver the Products and commodities into transport trucks and/or tank cars. Transport trucks to be driver loaded.

Operator shall receive additives from freight cars and/or trucks.

Operator shall blend additives for mixing with mineral spirits at a temperature not to exceed 180°F.

CHARGES

The only Charges for the Facilities and Services herein are the following:

\$440.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.

One-half cent (.005) per gallon on all liquid products received at the terminal with 200,000 gallons minimum receipts ruaranteed annually, to be billed at the 1st of each worth for the prior months' receipts and paid by Customer within 10 days after receipt of invoice, and plus --

One-half cent (.005) per rallon on all liquid products shipped from the terminal with 200,000 gallons minimum shipments guaranteed annually to be billed at the lst of each month for the prior months' shipments and paid by Customer within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed nuards as specified in Sections 8.3, 0.9(a) and  $11(\sigma)$  of the Agreement to which this definition is numerical and of which it is a part.

AMENDED SCHEDULE

TERMINAL:

TIME OIL CO., Portland, Oregon.

DATE OF AGREEMENT:

March 1, 1967

August 1, 1970 amended schedule.

INITIAL TERM OF AGREEMENT:

April 1, 1967 to March 31, 1972.

OPERATOR:

TIME OIL CO.

CUSTOMER:

WOOD TREATING CHEMICALS CO.

PRODUCTS TO BE STORED:

Raw materials in bulk, drums and bags for wood

preservatives.

Finished products in bulk and drums.

Also, such other raw materials and finished products specified by the Customer and accepted

by the Operator.

FACILITIES:

Operator will furnish Customer the following

facilities:

Storage tanks - one (1) tank with a shell capacity of approximately 30,000 gallons, three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of raw or finished

materials on pallets in drums and bags.

SERVICES:

Storage and Handling

Operator shall receive the raw materials from railroad tank cars or freight cars and/or trucks and shall deliver such products into storage tanks and/or warehouse.

Operator shall deliver the finished products into storage, trucks and/or railroad cars.

Operator shall mix or blend products at a temperature not to exceed 180 deg. F.

HANDLING AND TRANSFER CHARGES:

The only charges for the facilities and services herein are the following:

\$615.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.

One cent (0.01) per gallon for blending and shipping pentapetroleum or LST type solutions shipped in tank cars, tank trucks or drums that can be bulk or tank blended. These products are Customer's products known as:

CHARGES: cont.

- 2. Woodtox Preprime RTU
- Woodtox 140 RTU
- Presstreat
- Woodtox 109 RTU
- Woodtox 109 w/o Penta

Other products of similar type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Three cents (0.03) per gallon for blending and shipping concentrate type solutions in tank cars, tank trucks or drums. These products are Customer's products known as:

- Timbertox 40 Concentrate
- 2. WR 340 Concentrate
- Woodtox Preprime Concentrate 3.
- Woodtox 140 Concentrate
- Inhibitor L
- Penta Wood Preservative Concentrate

Other concentrate type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Five cents (0.05) per gallon for filling 55 gallon drums.

One cent (0.01) per gallon for blending contaminated products returned to storage and/or blending Woodtox 109 w/o Penta to include Penta.

Seventy-five (0.75) cents for each 55 gallon drum of additives shipped that have been in storage and are shipped without blending with other products.

Blending, shipping and drum filling charges are to be invoiced by Operator to the Gustomer on the first day of each month for the shipments made during the previous month and Customer agrees to pay charges within 10 days after receipt of invoice.

Overtime and extra 1000r and cost of armed guards as specified in Sections B.3, D.9 (a) and 13 (c) of the Agreement to which this Schedule is annexed and which it is a part.

It is agreed by the parties hereto that the Schedule attached to the Agreement dated the 1st day of March, 1967, shall be superceded and replaced in its entirety by this Amended Schedule effective August 1,

It is further agreed that said Agreement dated the 1st day of March, 1967 is further amended as follows:

On Page 1, Section A.FACILITIES, Paragraph 2, line 7 after the word Agreement shall be added "Customer shall, however, inform Operator of any irregularities or deficiencies discovered during any such inspection."

-2-

On page 2, Paragraph 3, line 6. The amount \$5.8125 shall be substituted for the amount of \$4.25 stated therein.

On page 4, Paragraph 6, line 3. The word "similar" shall be deleted and after the word "cause" shall be added "beyond the control of Operator".

On page 5, Paragraph 8, line 2. The following shall be substituted for Paragraph 8 in its entirety. "Customer's representative shall have access to the truck and rail car loading rack, tanks and warehouse covered by this agreement, as a matter of course, but all other areas of Operator's terminal facilities shall be closed to Customer's representatives except when accompanied by a representative of Operator. While on Operator's terminal premises, Customer's representative shall comply at all times with any rules established from time to time by Operator in connection with the operation of the terminal."

On page 5, Paragraph 9. (a) wherever the amount of \$2.71 is stated the amount of \$3.875 shall be substituted therefor.

On page 8, Paragraph 13 (a), the following shall be substituted therefor:

"Performance of any obligation under this Agreement may be suspended by either party, in whole or in part, without liability, in the event of act of God, war, riot, fire, explosion, flood, drought, sabotage, inability to obtain fuel or power, accident, national, state, or other governmental laws, regulations, rules or orders, or any other circumstance of like nature beyond the reasonable control of such party, or labor trouble, strike, walkout, or injunction, whether or not any such delays within the reasonable control of such party, which delays, prevents, restricts or limits the performance of this agreement or the Consumption, sale, use or end use of the products or any product manufactured or processed therefrom or therewith. The affected party shall invoke this provision by promptly notifying the other party of the nature and estimated duration of the suspension. At Customer's option, the period specified for processing and/or delivery of the products hereunder shall be extended by the period of delay occasioned by any such suspension and processing or deliveries not performed or made during any suspension period shall be performed or made during such extention, or the period specified for processing and/or delivery shall not be extended and the total contract quantity hereunder shall be reduced by the processing or deliveries not performed or made during such suspension and, in either event, the contract shall otherwise remain uneffected."

The following provisions are incorporated therein:

Disposal of waste shall be for the Customer's account but subject to Customer's prior approval of expenditures for that purpose.

Customer shall reimburse Operator for fines or renalties imposed upon Operator by a court of law and paid in full by Operator, which fines are for pollution, expressly prohibited by statute, proved in said court to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement. Customer shall also re-imburse Operator for all attorneys fees and costs of suit incurred in the defense of any suit brought against Operator for pollution proved to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement.

All other of the terms and provisions of said Agreement shall remain the same and in full force and effect.

Witness:

TIME OIL CO., Operatof

R. D. Abendroth, Presider

Witness:

WOOD TREATING CHEMICALS CO.

Centre L'Wright

y Sawell E. Suty and Secretary

## AMENDED SCHEDULE

TERMINAL:

TIME OIL CO., Portland, Oregon.

DATE OF AGREEMENT:

NT: March 1, 196'

March 1, 1967 August 1, 1970 amended schedule.

INITIAL TERM OF AGREEMENT:

April 1, 1967 to March 31, 1972.

OPERATOR:

TIME OIL CO.

CUSTOMER:

WOOD TREATING CHEMICALS CO.

PRODUCTS TO BE STORED:

Raw materials in bulk, drums and bags for wood

preservatives.

Finished products in bulk and drums.

Also, such other raw materials and finished products specified by the Customer and accepted

by the Operator.

FACILITIES:

Operator will furnish Customer the following

facilities:

Storage tanks - one (1) tank with a shell capacity of approximately 38,000 gallons, three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of raw or finished

materials on pallets in drums and bags.

SERVICES:

Storage and Handling

Operator shall receive the raw materials from railroad tank cars or freight cars and/or trucks and shall deliver such products into storage tanks and/or warehouse.

Operator shall deliver the finished products into storage, trucks and/or railroad cars.

Operator shall mix or blend products at a temperature not to exceed 180 deg. F.

HANDLING AND TRANSFER CHARGES:

The only charges for the facilities and services herein are the following:

\$615.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.

One cent (0.01) per gallon for blending and shipping pentapetroleum or LST type solutions shipped in tank cars, tank trucks or drums that can be bulk or tank blended. These products are Customer's products known as:

CHARGES: cont.

- 1. Woodtox Preprime RTU
- 2. Woodtox 140 RTU
- 3. Presstreat
- . Woodtox 109 RTU
- 5. Woodtox 109 w/o Penta

Other products of similar type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Three cents (0.03) per gallon for blending and shipping concentrate type solutions in tank cars, tank trucks or drums. These products are Customer's products known as:

- 1. Timbertox 40 Concentrate
- 2. WR 340 Concentrate
- 3. Woodtox Proprime Concentrate
- 4. Woodtox 140 Concentrate
- 5. Inhibitor L
- 6. Penta Wood Preservative Concentrate

Other concentrate type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Five cents (0.05) per gallon for filling 55 gallon drums.

One cent (0.01) per gallon for blending contaminated products returned to storage and/or blending Woodtox 109 w/o Penta to include Penta.

Seventy-five (0.75) cents for each 55 gallon drum of additives shipped that have been in storage and are shipped without blending with other products.

Blending, shipping and drum filling charges are to be invoiced by Operator to the Customer on the first day of each month for the shipments made during the previous month and Customer agrees to pay charges within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed guards as specified in Sections B.3, D.9 (a) and l3 (c) of the Agreement to which this Schedule is annexed and which it is a part.

It is agreed by the parties hereto that the Schedule attached to the Agreement dated the 1st day of March, 1967, shall be superceded and replaced in its entirety by this Amended Schedule effective August 1, 1970.

It is further agreed that said Agreement dated the 1st day of March, 1967 is further amended as follows:

On Page 1, Section A.FACILITIES, Paragraph 2, line 7 after the word Agreement shall be added "Customer shall, however, inform Operator of any irregularities or deficiencies discovered during any such inspection."

On page 2, Paragraph 3, line 6. The amount \$5.8125 shall be substituted for the amount of \$4.25 stated therein.

On page 4, Paragraph 6, line 3. The word "similar" shall be deleted and after the word "cause" shall be added "beyond the control of Operator".

On page 5, Paragraph 8, line 2. The following shall be substituted for Paragraph 8 in its entirety. "Customer's representative shall have access to the truck and rail car loading rack, tanks and warehouse covered by this agreement, as a matter of course, but all other areas of Operator's terminal facilities shall be closed to Customer's representatives except when accompanied by a representative of Operator. While on Operator's terminal premises, Customer's representative shall comply at all times with any rules established from time to time by Operator in connection with the operation of the

On page 5, Paragraph 9. (a) wherever the amount of \$2.71 is stated the amount of \$3.875 shall be substituted therefor.

On page 8, Paragraph 13 (a), the following shall be substituted therefor:

"Performance of any obligation under this Agreement may be suspended by either party, in whole or in part, without liability, in the event of act of God, war, riot, fire, explosion, flood, drought, sabotage, inability to obtain fuel or power, accident, national, state, or other governmental laws, regulations, rules or orders, or any other circumstance of like nature beyond the reasonable control of such party, or labor trouble, strike, walkout, or injunction, whether or not any such delays within the reasonable control of such party, which delays, prevents, restricts or limits the performance of this agreement or the consumption, sale, use or end use of the products or any product manufactured or processed therefrom or therewith. The affected party shall invoke this provision by promptly notifying the other party of the nature and estimated duration of the suspension. At Customer's option, the period specified for processing and/or delivery of the products hereunder shall be extended by the period of delay occasioned by any such suspension and processing or deliveries not performed or made during any suspension period shall be performed or made during such extention, or the period specified for processing and/or delivery shall not be extended and the total contract quantity hereunder shall be reduced by the processing or deliveries not performed or made during such suspension and, in either event, the contract shall otherwise remain uneffected. "

The following provisions are incorporated therein:

Disposal of waste shall be for the Customer's account but subject to Customer's prior approval of expenditures for that purpose.

Customer shall reimburse Operator for fines or renalties imposed upon Operator by a court of law and paid in full by Operator, which fines are for pollution, expressly prohibited by statute, proved in said court to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement. Customer shall also re-imburse Operator for all attorneys fees and costs of suit incurred in the defense of any suit brought against Operator for pollution proved to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement.

All other of the terms and provisions of said Agreement shall remain the same and in full force and effect.

Witness:

TIME OIL CO., Operator

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R. D. Abenaroth, President

Witness:

WOOD TREATING CHEMICALS CO.

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Esst. Sec

## AMENDED SCHEDULE

TERMINAL:

TIME OIL CO., Portland, Oregon.

DATE OF AGREEMENT:

March 1, 1967 August 1, 1970 amended schedule.

INITIAL TERM
OF AGREEMENT:

April 1, 1967 to March 31, 1972.

OPERATOR:

TIME OIL CO.

CUSTOMER:

WOOD TREATING CHEMICALS CO.

PRODUCTS TO BE STORED:

Raw materials in bulk, drums and bags for wood preservatives.

Finished products in bulk and drums.

Also, such other raw materials and finished products specified by the Costomer and accepted by the Operator.

FACILITIES:

Operator will furnish Customer the following facilities:

Storage tanks - one (1) tank with a shell capacity of approximately 38,000 gallons, three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of raw or finished materials on pallets in drums and bags.

SERVICES:

Storage and Handling

Operator shall receive the raw materials from railroad tank cars or freight cars and/or trucks and shall deliver such products into storage tanks and/or warehouse.

Operator shall deliver the finished products into storage, trucks and/or railroad cars.

Operator shall mix or blend products at a temperature not to exceed 180 deg. F.

HANDLING AND TRANSFER CHARGES:

The only charges for the facilities and services herein are the following:

\$615.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.

One cent (0.01) per gallon for blending and shipping pentapetroleum or LST type solutions shipped in tank cars, tank trucks or drums that can be bulk or tank blended. These products are Customer's products known as:

CHARGES: cont. Woodtox Preprime RTU Woodtox 140 RTU

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- Presstreat
- Woodtox 109 RTU Woodtox 109 w/o Penta

Other products of similar type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Three cents (0.03) per gallon for blending and shipping concentrate type solutions in tank cars, tank trucks or drums. These products are Customer's products known as:

- Timbertox 40 Concentrate
- WR 340 Concentrate
- Woodtox Preprime Concentrate
- Woodtox 140 Concentrate
- Inhibitor L
- Penta Wood Preservative Concentrate

Other concentrate type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Five cents (0.05) per gallon for filling 55 gallon drums.

One cent (0.01) per gallon for blending contaminated products returned to storage and/or blending Woodtox 109 w/o Penta to include Penta.

Seventy-five (0.75) cents for each 55 gallon drum of additives shipped that have been in storage and are shipped without blending with other products.

Blending, shipping and drum filling charges are to be invoiced by Operator to the Customer on the first day of each month for the shipments made during the previous month and Customer agrees to pay charges within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed guards as specified in Sections B.3, D.9 (a) and 13 (c) of the Agreement to which this Schedule is annexed and which it is appart.

It is agreed by the parties hereto that the Schedule attached to the Agreement dated the 1st day of March, 1967, shall be superceded and replaced in its entirety by this Amended Schedule effective August 1,

It is further agreed that said Agreement dated the 1st day of March, 1967 is further amended as follows:

On Page 1, Section A.FACILITIES, Paragraph 2, line 7 after the word Agreement shall be added "Customer shall, however, inform Operator of any irregularities or deficiencies discovered during any such inspection.

-2-

On page 2, Paragraph 3, line 6. The amount \$5.8125 shall be substituted for the amount of \$4.25 stated therein.

On page 4, Paragraph 6, line 3. The word "similar" shall be deleted and after the word "cause" shall be added "beyond the control of Operator".

On page 5, Paragraph 8, line 2. The following shall be substituted for Paragraph 8 in its entirety. "Customer's representative shall have access to the truck and rall car loading rack, tanks and warehouse covered by this agreement, as a matter of course, but all other areas of Operator's terminal facilities shall be closed to Customer's representatives except when accompanied by a representative of Operator. While on Operator's terminal premises, Customer's representative shall comply at all times with any rules established from time to time by Operator in connection with the operation of the terminal."

On page 5, Paragraph 9. (a) wherever the amount of \$2.71 is stated the amount of \$3.875 shall be substituted therefor.

On page 8, Paragraph 13 (a) the following shall be substituted therefor:

"Performance of any obligation under this Agreement may be suspended by either party, in whole of in part, without liability, in the event of act of God, war, riot, fire, explosion, flood, drought, sabotage, inability to obtain fuel or power, accident, national, state, or other governmental laws, regulations, rules or orders, or any other circumstance of like nature beyond the reasonable control of such party, or labor trouble, strike, walkout, or injunction, whether or not any such delays within the reasonable control of such party, which delays, prevents, restricts or limits the performance of this agreement or the consumption, sale, use or end use of the products or any product manufactured or processed therefrom or therewith. The affected party shall invoke this provision by promptly notifying the other party of the nature and estimated duration of the suspension. At Customer's option, the period specified for processing and/or delivery of the products hereunder shall be extended by the period of delay occasioned by any such suspension and processing or deliveries not performed or made during such extention, or the period specified for processing and/or delivery shall not be extended and the total contract quantity hereunder shall be reduced by the processing or deliveries not performed or made during such suspension and, in either event, the contract shall otherwise remain uneffected."

The following provisions are incorporated therein:

Disposal of waste shall be for the Customer's account but subject to Customer's prior approval of expenditures for that purpose.

Customer shall reimburse Operator for fines or penalties imposed upon Operator by a court of law and paid in full by Operator, which fines are for pollution, expressly prohibited by statute, proved in said court to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement. Customer shall also re-imburse Operator for all attorneys fees and costs of suit incurred in the defense of any suit brought against Operator for pollution proved to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement.

All other of the terms and provisions of said Agreement shall remain the same and in full force and effect.

Witness:

TIME OIL CO., Operator

R. D. Abendroth, Presiden

Witness:

WOOD TREATING CHEMICALS CO.

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## AGREEMBNT

THIS ACREMENT, made and entered into this lat day of March, 1967, by and between TIME OIL CO. (hereinafter referred to as "Operator"), a corporation incorporated and existing under the laws of the State of Washington, and WOOD TREATING CHEMICALS CO. (hereinafter referred to as "Customer"), a corporation organized and existing under the laws of the State of Missouri.

#### WITHESSETH:

For and in consideration of the mutual covenants and conditions contained herein, it is agreed as follows:

#### A. FACILITIES.

- 1. Operator shall provide and furnish to Customer during the term of this Agreement facilities, storage table, blending tanks, aquipment; improvements and werehouse space as set forth in the Schedule attached hereto and as set forth in this Agreement (all hereinefter called "Facilities").
- 2. Operator shall rotain possession of the Facilities and shall keep and maintain the same in good order and repair and clean and fit for the storage and handling of the Products. Customer shall have the right to inspect the Facilities and the Products stored therein at all times during the herein-after defined Regular Hours, and during other reasonable times, but no such inspection shall relieve Operator of any of its obligations under this Agreement. Operator shall advise Customer in writing in advance of any changes or alterations in or to the Facilities (excluding, however, maintenance and repairs) which are used for the receipt, storage, blending, bendling or redelivery of the Products.

## B. SERVICES.

1. Operator shell provide and furnish to Customer during the term of this Agreement any and all labor and services necessary or reasonably incidental to receive, store, handle, blend and redeliver the Products at, to and from the Facilities in a safe, efficient, clean and prompt manner (all hereinsfer called the "Services").

- 2. Operator shall receive the Products from trucks and rail cars, store the same in the storage tanks, transfer such Products to the blending tanks as directed by Customer, and redeliver such Products into trucks and rail cars, as and when directed by Customer. Operator shall follow the procedures outlined in the booklet entitled "Monsanto Warehousing and Terminaling Unified Procedures" and all reasonable amendments thereof and additions thereto, applicable to the Products involved. A copy of such booklet is attached hereto as Exhibit A and made a part hereof. Operator shall keep complete and accurate records of the type and quantity of the Products received into, transferred out of, and remaining in said Facilities at all times and of all shipments of the Products made at Customer's request, and such records shall be open to inspection by Customer at all reasonable times. Operator shall make reports to Customer with respect to such receipts, shipments and inventories, at such times and in such manner as may be reasonably prescribed by Customer.
- 3. The Services shall be performed from 7:00 m.m. to 4:30 p.m., five days per weak, Monday through Friday, except for the holidays hereinafter mentioned, herein called the "Regular Hours." The holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day and Christmas. Upon the request of Customer, Operator shall perform such services beyond Regular Hours at an additional charge of \$\frac{44.25}{2.55}\$ per men hour.
- C. PARMENTS. So long as Operator shall meet its obligations hereunder, Customer shall make payments to Operator during the term of this Agreement according to the Charges on the attached Schedule.

### D. GENERAL.

- 1. Heither Operator, nor any person or party claiming by, through or under Operator, shall ever have or assert any right, title; claim, lies or interest in or to any of the Products.
- 2. In no event, anything in this Agreement to the contrary notwithstending, does Operator intend to lease, sublesse or assign to the Customer all or any part of the Facilities referred to herein, and neither this Agreement, nor any provision thereof, shall be so construed.

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- 3. Operator shall indemnify and hold harmless Customer from and against any and all liabilities, claims, actions, damages, losses, costs or expenses arising out of injury to or death of any person or damage to or loss or destruction of any property, caused by or connected with: (a) any negligence, or wrongful act or omission of Operator, its employees or agents in the receipt, storage, handling or redelivery of the Products, or any of them; (b) the performance or nonperformance of any of its obligations or operations under this Agreement; or (c) any default of Operator hereunder.
- 4. Operator shall obtain and maintain, at its expense, during the torm of this Agreement, the following insurance in insurance companies satisfactory to Customer:
  - (a) Workmen's compensation insurance in an amount equal to the limit of liability and in the form prescribed by the laws of Oregon, for all Operator's employees engaged in any operations under this Agraement. In the event that any employees are not protected by a workmen's compensation statute, Operator shall provide employer's liability insurance in an amount not less than \$100,000 for injury to or for death of any one employee, and subject to the same limitation for each employee, in an amount not less than \$300,000 on account of any one accident.
  - (b) Public liability insurance sufficient to cover the obligations assumed by Operator pursuant to Section D.3 of this Agreement and claims for injury to or death of persons or damage to property arising from any activities or operations of Operator under this Agreement in amounts of:
    - (i) not less than \$150,000 for injury to or death of any one person and not less than \$500,000 in respect to any one accident; and
    - (ii) not less than \$100,000 for damage to or destruction of property on account of each accident.

Operator shall furnish Customer with certificates of insurance which pertificates shall provide that the foregoing insurance coverage shall not be terminated or reduced without the insurance carrier first giving Customer ten (10) days prior written notice thereof.

- 5. Operator shall be liable and responsible for any loss, destruction, spoilage, spillage, pollution, evaporation, shrinkage, line-loss, clingage, discoloration or contamination of, or damage to, any Products arising out of its receipt, storage, handling, blending, mixing or redelivery thereof, or of any of the Services performed or to be performed hereunder resulting from the negligence or wrongful act or omission of Operator, its employees, agents or representatives, or default of Operator under this Agreement.
- demaged or destroyed or become unfit by reason of fire, explosion, accident, casualty or any other similar cause, or if any of the Facilities are taken or condemned by eminent domain proceedings (all of the foregoing being hereinafter for nonvenience methantively called "Casualty") and that the same should be randered unsuitable or unavailable for the receipt, storage, handling and redelivery of any of the Products, Operator shall immediately notify Customer thereof. Not later than ten (10) days after the occurrence of such Casualty, Operator shall also notify Customer as to whether the Facilities will be restored to their former condition within a period of time not longer than six (6) months measured from the date of such Casualty. If such notice is not given, or if given and the Facilities are not restored by the end of said six (6) month period, Customer may terminate this Agreement at any time thereafter upon notice to Operator, and thereupon Customer shall be relieved of all duties and obligations hereunder.
  - 7. (a) Losses of any Product for which Operator is responsible hereunder shall be determined monthly at the end of each month, commencing with the date of the first receipt of such Froduct by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals of such Product during the period for which the accounting

is made, plus the stock of such Product on hand at the end of such period, from the sum of the total receipts of such Product during such period plus the stock of such Product on hand at the beginning of such period.

- (b) Operator shall not be liable for actuallosses resulting from normal spillage and evaporation not in excess of the loss allowance hereinafter described. The term "loss allowance" shall mean actual losses resulting from normal spillage and evaporation not exceeding 3/4 of 1% per month of the aggregate of the receipte per month or 3/4 of 1% of the maximum amount of Products stored in any one month, whichever is greater, of any such Product as determined under Section D.9(b) of this Agreement.
- 3. While on Operator's terminal premises, Customer shall comply at all times with any and all rules established as of the date of this Agreement by Operator in connection with the operation of the terminal. A copy of such rules is attached hereto as Exhibit B to this Agreement. Such rules shall not hereafter be smended except by consent of Customer.
  - 9. (a) If the average wage rate in effect at the terminal for all employees of Operator employed full or part time at the terminal as of the first day of any month shall exceed \$2.71 per hour, then, with respect to such month, the handling and trunsfer charges set forth in the schedule(s) shall be increased by a percentage equal to 25 per cent (25%) of that percentage of \$2.71 which the excess of the average wage rate of \$2.71 constitutes. "Average wage rate" means the amount derived by dividing (a) the total of (1) the rates for the single-rate classifications of wage rates applicable to Operator's personnel and (11) the mid-points or wage rates for all rate-range classifications applicable to Operator's personnel by (b) the

- 9 -

mamber of classifications applicable to Operator's personnel.

- (b) The quantity of Product received into or withdrawn from storage tanks shall be determined by Operator's representatives by checking and gauging said tanks at the time of receipt or withdrawel of said Product. Customer may assist, supervise, or participate in all aspects of such checking and gauging, but in the absence of such participation, gauges taken by Operator shall be conclusive, unless such gauges are proven to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually acceptable calibration charts of the rail car or truck tanks. The cost of such work done by Operator's representatives or licensed inspectors shall be borne by Customer. In the event of any disagramment as to quantities of Products received, it shall, upon written notice of gither party to the other, be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date the case is submitted, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto and the law of Missouri shall govern the arbitration and award.
- (a) If requested by Customer, Operator will take samples from rail tank care, sutomotive tank trucks and storage tanks and deliver such samples to Customer and the cost of containers for such samples paid by Operator and the freight charges for deliveries thereof to Customer shall be reimbursed to Operator by Customer each month. Samples shall be taken in accordance with the procedure specified by Customer.

(d) All quantities of Iroduct delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees Fahrenheit (60°F) in accordance with recognized temperature correction tables.

The term "parrel" whenever used herein, means the degrees Fahrenheit (60°).

(Wext para raph number 10 on following page #7)

-6**A**-

- 10. Without relieving Operator from any of its duties or bbligations under this Agreement, for each day or portion thereof that:
  - (a) The Facilities are unsuitable for the receipt, storage, blending, handling or redelivery of any of the Products by reason of any Casualty or for any other similar or dissimilar reason, and/or
  - (b) Operator fails or refuses to provide and furnish the Services.

then, and in either event, the Charges set forth in the Schedule shall be suspended for such period or periods; furthermore, if Operator fails or refuses to radeliver any of the Products within five (5) days after Customer's request therefor, Customer shall have the right to enter upon the Facilities and remove such Products from the storage eres.

- 11. Customer agrees to emmine Operator's tanks, pipelines and equipment prior to Customer's acceptance and use of their Facilities hereunder' and by such use agrees that said Facilities are acceptable for rendering of the Services referred to herein. Operator may substitute other suitable facilities in lieu of those which are designated hereunder provided Operator pays any costs incurred by Customer in regard to such substitution.
- the storage, blending and handling of only the Products and commodities specified in said Schedule; provided, however, that anything in this Agreement to the contrary notwithstanding, Customer shall not store and/or handle or cause to be stored and/or handled in any of these Facilities (a) any commodity other than those listed on such Schedule containing hydrogen sulphide or other corrosive materials, (b) any commodity other than those listed on such Schedule which would in any way be injurious to any of the Facilities, or (a) any commodity other than those listed on such Schedule which would render any of the Facilities unfit, after cleaning, for the proper storage and/or handling of water white oils.

  Customer shall be responsible for any damages resulting from the storage and/or handling in any of these Facilities of any commodity other than those listed in the Schedule which say not be stored and/or handled therein under the terms hereof.

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- 13. (a) Subject to the terms of Sections 6 and 10, hereof, neither party shall be liable to the other for, and each shall be excused from, any failure of or delay in performance under this agreement, caused by any acts of God or the public enemy, war, floods, storms, earthquakes, lightning, or other act of the elements, accidental fires, explosion, strikes, labor disturbances, riots, insurrection, civil commotion, governmental acts or regulations, accidents, failure or delay of transportation or delivery facilities or supplies, failure or delay of manufacturers or persons from whom such party is obtaining machinery, equipment, materials or supplies to deliver the same, or any other cause beyond the control and without the fault or neglect of such party, whether similar or not to the forgoing causes. For each day or portion thereof that either party shall fail or be unable to perform by reason of any of the forgoing events, the said charges set forth in the Schedule shall be suspended for such period or periods. Each party shall, in the event it shall fail or be unable to perform by reason of any of the foregoing events, promptly notify the other party thereof. Upon cessation of any such event, performance shall be resumed promptly and the other party shall be notified immediately thereof.
  - (b) Should the County or City, in which Operator's

    Facilities are located, or any other government agency,
    local or federal prohibit operation of any then
    existing Facilities used in performing this Agreement,
    or shall in any way deprive Operator of the right to
    use any such Facilities or any property in connection
    therewith, or shall require the construction of
    additional Facilities to be used in performing this
    Agreement, this Agreement shall terminate at the
    option of Operator, unless Customer shall pay for the
    cost of replacing any such Facilities or property of

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which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such government agency.

(c) The cost of any Armed Quard Services and/or other protective services or facilities required by Customer or by any government agency shall be for the account of Customer.

14. Operator shall bill Customer monthly in advance and Customer agrees to pay Operator within 10 days after presentation of invoice. All payments hereunder shall be made to Operator at its office at 12005 N. Burgard St., P. O. Box 03117, Portland, Ore on 97203, or at such other place as Operator may notify Customer in writing.

15. Customer agrees promptly upon expiration or termination of this Agreement, to remove all of its Products, either bulk or packaged, from Operator's premines. All such Products not removed within 60 days after the expiration or distribution of this Agreement may be sold at suction by Operator and Operator shall return to Customer the proceeds of any such sale, less the amount owed Operator by Customer under the terms of this Agreement and Operator's reasonable expenses in selling said Products.

of April 1, 1967 and, if not carlier terminated as herein provided, shall end on March 31, 1972. Upon the expiration of the initial term of this Agreement, this Agreement shall be automatically renewed for a term of five years, and automatically renewed thereafter for successive terms of five years each; provided, however, that either party, at its option, shall have the right to terminate this Agreement at the end of any renewal term by furnishing written notice to the other party at least one year prior to the designated termination date.

- 9 -

- 16. (h) Provided that Customer may, at its option; terminate this Agreement at any time during the initial term of this Agreement by making a payment to Operator which is equal to Operator's total expenditures for storage, blending tunks, heating elements, warehouse improvements or improvements to any such Facilities which were expended by Operator for the purpose of furnishing storage or blending tanks and Facilities to Customer, less 20% of the total expenditures for each full year that this Agreement has been in full force and effect.

  represents
  The Operator/that the amount expended covering the above is \$ 4.220.00—.
  - (c) Should Operator full or refuse to discharge any of its obligations under this Agreement, Customer may, at its option and in addition to any other remedies provided for herein, terminate this Agreement immediately upon giving notice to Operator.
- or be placed in the hands of a receiver, State of Federal, then, and in any such event, the minimum monthly storage and bandling charges for the whole unexpired term hereof together with all accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement and, after giving 15 days' notice to Customer, Operator may sell all or any portion of such Products, at public or private sale, but Operator may not be purchaser at such sale or sales. Customer shall pay for and indemnify Operator against its reasonable expenses of such sale, including reasonable attorney's fees, incurred by Operator for the sale of Customer's Products as above provided, for storage, handling services or other amounts due and owing Operator. Any proceeds of such sale less any amounts due and owing from Customer to Operator under this Agreement and the reasonable expenses of such sale, shall be promptly remitted by Operator to Customer.

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- eliminate the handling, blending or storage of any of the Products so that the Pacilities are not used or required, Operator shall, at Customer's request, use all reasonable efforts, and otherwise cooperate with Customer, to find and make arrangements with another party or parties to utilize such unused or unrequired. Facilities to the extent and as designated by Customer, Operator shall, however, have the right to establish reasonable fees and charges in connection with such arrangements. Customer shall be entitled to a credit against all fees (but not exceeding any amounts due from Customer) to the extent of payments made by such other party or parties pursuant to said arrangements.
- 19. Customer shall pay any and all taxes, charges and/or assessments on or with respect to the Products. Operator shall pay any and all taxes, charges and/or assessments on or with respect to the Facilities and/or Services.
- 20. Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator berounder or the nesses of customers to whom delivery of such Products or other products is scheduled or made.
- 21. Operator is not and shall not set or purport to set as an employee, agent or representative of Customor, but is and abell set as an independent contractor.
- 22. Operator shall obtain and maintain all legally required .

  state and local licenses and permits required for construction, maintenance or operation of the Facilities and/or the Services or Operator's performance of this Agreement.
- 23. Operator agrees to assume liability for any demurrage on rail equipment or truck equipment, which occurs directly as a result of Operator's operations. Any demurrage accruing on rail equipment or truck equipment, through no fault of Operator shall be paid by Customer; provided, however, Operator shall, in good faith, furnish Customer with all evidence and information known to Operator with respect to the facts, circumstances and causes connected with rail or truck demurrage.

- 11 -

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Customer to the Monsanto Company or to any subsidiary company in which Customer owns or controls at least a 50% interest or to an associated company in which the Monsanto Company owns or controls at least a 50% interest, neither party shall transfer or assign this Agreement, or any of its rights bereunder, in whole or in part, without the prior written consent of the other party, and any attempt to do so without such consent shall be void. Subject to the foregoing, this Agreement shall inure to the benefit of and be binding upon the parties hereto and their respective successors and sesigns.

25. Except as otherwise provided in this Agreement, any notice required or permitted to be given under this Agreement shall be in writing and shall be sufficiently given when delivered in person or when deposited in the United States rulls (registered or certified), postage prepaid, addressed as follows:

If to Operator, addressed to:

Time Oil Co. 5150 Wilshire Bouleverd Los Angoles, California 90036

and a copy to:

12005 N. Burgard Street P. O. Box 03117 Portland, Oregon 97203

If to Customer, addressed to:

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Wood Trenting Chemicals Co. 5137 Southwest Avenue St. Louis, Mo. 63110 Attn: R. M. Morriss. Jr.

or to such other address as may be specified from time to time in a written notice given by such party. Both parties agree to acknowledge in writing receipt of any notice delivered in person. Routine operating instructions, requests, directions and other similar routine communications shall not require a notice as shows provided and may be given in such manner and to such persons as may be customary or practicable.

26. This Agreement constitutes the sole agreement between the parties partaining to the Facilities and/or Services.

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27. The section and paragraph headings in this Agreement are inserted for convenience only and are in no way to be construed as part of this Agreement or as a limitation of the scope of the particular sections or paragraphs to which they refer.

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the day and year first hereinsbove written.

THE OIL CO.

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WOOD TREATING CHEMICALS CO.

ATTEST:

J. Russell Bly W.

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#### SCHEDULE

TERMINAL:

TIME OIL CO., Portland, Oregon.

DATE OF

ACREEMENT:

March 1, 1967.

INITIAL TERM OF

A GREEN FAT:

April 1, 1967 to March 31, 1972.

OPERATOR:

TIME OIL CO.

CUSTOMER:

WOOD TREATING CHEMICALS CO.

PRODUCTS TO

BE STORED:

Mineral spirits with additives.

FACILITIES:

Operator will furnish Customer the following Facilities:

Storage Tanks:

Three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of additives on pullets in drums and bags. Additives being pentchloro-phenol in bags and Customer's additive #316 in drums.

#### STRVICES:

Storage and handlings

Operator shall receive the Products from tank cars and/or transport trucks and shall deliver such Products into storage tanks.

Operator shall deliver the Products and commodities into transport trucks and/or tank cars. Transport trucks to be driver loaded.

Operator shall receive additives from freight cars and/or trucks.

Operator shall blend additives for mixing with mineral spirits at a temperature not to exceed 180°F.

CHARGES:

The only Charges for the Facilities and Services herein are the following:

\$lili0.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.

One-half cent (.005) per gallon on all liquid products received at the terminal with 200,000 gallons minimum receipts guaranteed annually, to be billed at the 1st of each wonth for the prior months' receipts and paid by Customer within 10 days after receipt of invoice, and plus --

One-half cent (.005) per sallon on all liquid products shipped from the terminal with 200,000 gallons minimum shipments guaranteed annually to be billed at the lot of each month for the prior months' shipments and paid by Customer within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed guards as speciflat in Sections 3.3, D.9(a) and 13(c) of the Agreement to which this Schodule is nameded and of which it is a part.

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## AMENDED SCHEDULE

TERMINAL:

TIME OIL CO., Portland, Oregon.

DATE OF AGREEMENT:

March 1, 1967 August 1, 1970 amended schedule.

INITIAL TERM OF AGREEMENT:

April 1, 1967 to March 31, 1972.

OPERATOR:

TIME OIL CO.

CUSTOMER:

WOOD TREATING CHEMICALS CO.

PRODUCTS TO BE STORED:

Raw materials in bulk, drums and bags for wood preservatives.

Finished products in bulk and drums.

Also, such other raw materials and finished products specified by the Customer and accepted by the Operator.

FACILITIES:

Operator will furnish Customer the following facilities:

Storage tanks - one (1) tank with a shell capacity of approximately 30,000 gallons, three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of raw or finished materials on pallets in drums and bags.

SERVICES:

Storage and Handling

Operator shall receive the raw materials from railroad tank cars or freight cars and/or trucks and shall deliver such products into storage tanks and/or warehouse.

Operator shall deliver the finished products into storage, trucks and/or railroad cars.

Operator shall mix or blend products at a temperature not to exceed 180 deg. F.

HANDLING AND TRANSFER CHARGES:

The only charges for the facilities and services herein are the following:

\$615.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.

One cent (0.01) per gallon for blending and shipping pentapetroleum or LST type solutions shipped in tank cars, tank trucks or drums that can be bulk or tank blended. These products are Customer's products known as:

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CHARGES: cont.

- 1. Woodtox Preprime RTU
- 2. Woodtox 140 RTU
- 3. Presstreat
- 4. Woodtox 109 RTU 5. Woodtox 109 w/o Ponta

Other products of similar type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Three cents (0.03) per gallon for blending and shipping concentrate type solutions in tank cars, tank trucks or drums. These products are Customer's products known as:

- 1. Timbertox 40 Concentrate
- 2. WR 340 Concentrate
- 3. Woodtox Proprime Concentrate
- 4. Woodtox 140 Concentrate
- 5. Inhibitor L
- 6. Penta Wood Preservative Concentrate

Other concentrate type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Five cents (0.05) per gallon for filling 55 gallon drums.

One cent (0.01) per gallon for blending contaminated products returned to storage and/or blending Woodtox 109 w/o Penta to include Penta.

Seventy-five (0.75) cents for each 55 gallon drum of additives shipped that have been in storage and are shipped without blending with other products.

Blending, shipping and drum filling charges are to be invoiced by Operator to the Customer on the first day of each month for the shipments made during the previous month and Customer agrees to pay charges within 10 days after receipt of invoice.

Overtime and extra 1650r and cost of armed guards as specified in Sections B.3, D.9 (a) and 13 (c) of the Agreement to which this Schedule is annexed and which it is a part.

It is agreed by the parties hereto that the Schedule attached to the Agreement dated the 1st day of March, 1967, shall be superceded and replaced in its entirety by this Amended Schedule effective August 1, 1970.

It is further agreed that said Agreement dated the 1st day of March, 1967 is further amended as follows:

On Page 1, Section A.FACILITIES, Paragraph 2, line 7 after the word Agreement shall be added "Customer shall, however, inform Operator of any irregularities or deficiencies discovered during any such inspection."

On page 2, Paragraph 3, line 6. The amount \$5.8125 shall be substituted for the amount of \$4.25 stated therein.

On page 4, Paragraph 6, line 3. The word "similar" shall be deleted and after the word "cause" shall be added "beyond the control of Operator".

On page 5, Paragraph 8, line 2. The following shall be substituted for Paragraph 8 in its entirety. "Customer's representative shall have access to the truck and rail car loading rack, tanks and warehouse covered by this agreement, as a matter of course, but all other areas of Operator's terminal facilities shall be closed to Customer's representatives except when accompanied by a representative of Operator. While on Operator's terminal premises, Customer's representative shall comply at all times with any rules established from time to time by Operator in connection with the operation of the terminal."

On page 5, Paragraph 9. (a) wherever the amount of \$2.71 is stated the amount of \$3.875 shall be substituted therefor.

On page 8, Paragraph 13 (a), the following shall be substituted therefor:

"Performance of any obligation under this Agreement may be suspended by either party, in whole or in part, without liability, in the event of act of God, war, riot, fire, explosion, flood, drought, sabotage, inability to obtain fuel or power, accident, national, state, or other governmental laws, regulations, rules or orders, or any other circumstance of like nature beyond the reasonable control of such party, or labor trouble, strike, walkout, or injunction, whether or not any such delays within the reasonable control of such party, which delays, prevents, restricts or limits the performance of this agreement or the consumption, sale, use or end use of the products or any product manufactured or processed therefrom or therewith. The affected party shall invoke this provision by promptly notifying the other party of the nature and estimated duration of the suspension. At Customer's option, the period specified for processing and/or delivery of the products hereunder shall be extended by the period of delay occasioned by any such suspension and processing or deliveries not performed or made during such extention, or the period specified for processing and/or delivery shall not be extended and the total contract quantity hereunder shall be reduced by the processing or deliveries not performed or made during such suspension and, in either event, the contract shall otherwise remain uneffected."

The following provisions are incorporated therein:

Disposal of waste shall be for the Customer's account but subject to Customer's prior approval of expenditures for that purpose.

Customer shall reimburse Operator for fines or penalties imposed upon Operator by a court of law and paid in full by Operator, which fines are for pollution, expressly prohibited by statute, proved in said court to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement. Customer shall also re-imburse Operator for all attorneys fees and costs of suit incurred in the defense of any suit brought against Operator for pollution proved to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement.

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All other of the terms and provisions of said Agreement shall remain the same and in full force and effect.

Witness:

TIME OIL CO., Operator

R. D. Abendroth, President

Witness

WOOD TREATING CHEMICALS CO.

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SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
SAN PEDRO
LOS ANGELES



# TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

January 28, 1981

Wood Treating Chemicals Dept. Koppers: Company 5137 Southwest Ave. St. Louis, Missouri 63110

Attention: Mr. Robt. F. Simmons

Gentlemen:

Under date of March 1st, 1967 we entered into an Agreement with you to provide certain labor and services to receive, store, handle, blend and redeliver certain products of yours at our Portland, Oregon terminal.

The term of said agreement ran from April 1, 1967 to March 31, 1972 and automatically renewed for two additional terms of five years each, the present term expiring March 31, 1982.

As discussed with you on the phone this date, we are hereby giving you notice of our election to terminate said Agreement effective March 31, 1982.

Very truly yours,

TIME OIL CO.

A. A. Schneider Vice-President

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

SENDER:	Complete items 1, 2, and 3. Add your address in the "RE preverse.	on Seek "OT KNUTE
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#### **UNITED STATES POSTAL SERVICE** OFFICIAL BUSINESS

SENDER INSTRUCTIONS

Print your name, address, and ZIP Code in the space below.

- Complete items 1, 2, and 3 on the reverse.
- Attach to front of article if space permits, otherwise afflix to back of article.
- Endorse article "Return Receipt Requested" adjecent to number.

PENALTY FOR PRIVATE USE TO AVOID PAYMENT OF POSTAGE, \$300



**RETURN** TO



P. Opp. 180X 24447

(City, State, and ZIP Code)

SEATTLE TACOMA PORTLAND STOCKTON RENO RICHMOND SAN PEDRO LOS ANGELES



## TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

January 28, 1981

Wood Treating Chemicals Dept. Koppers: Company 5137 Southwest Ave. St. Louis, Missouri 63110

Attention: Mr. Robt. F. Simmons

Gentlemen:

Under date of March 1st, 1967 we entered into an Agreement with you to provide certain labor and services to receive, store, handle, blend and redeliver certain products of yours at our Portland, Oregon terminal.

The term of said agreement ran from April 1, 1967 to March 31, 1972 and automatically renewed for two additional terms of five years each, the present term expiring March 31, 1982.

As discussed with you on the phone this date, we are hereby giving you notice of our election to terminate said Agreement effective March 31, 1982.

Very truly yours,

TIME OIL CO.

A. A. Schneider Vice-President

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

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From the lesk of
DONALD F. MARION

Paul

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Time Oil agreement. Please

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# DRAFT

# STORAGE AND CONCENTRATE DILUTION AGREEMENT

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	19, by	and between	en TIME O	IL CO. $(\overline{h})$	ereinafter	referred	i to as
"Operator")	a corpor	ation inco	rporated	and exist	ing under	the laws	of the
State of Was	hington a	nd KOPPERS	COMPANY,	INC. (he	reinafter	referred	to as
"Customer"),	a corpor	ation orga	nized and	existing	under the	laws of	the State
of Delaware.							

WHEREAS, Operator is the owner of certain terminal facilities and whereas, Customer desires to obtain permission to place its hereinafter described products therein; the parties hereto agree as follows:

FACILITIES AND TERM: Operator does hereby agree to provide and Customer does hereby agree to accept certain terminal facilities and handling services, at 12005 North Burgard, Portland, Oregon as set forth in the schedule attached, and as hereinafter provided. This agreement shall be for a term of 3 years, beginning on the 1st day of May, 1983, and continuing through the 30th day of April, 1986. expectine date of this agreement

Leustomer warrants that he has examined and inspected Operator's tanks, pipelines and equipment and the rail and truck facilities, and that Customer is fully aware of the limitations and condition thereof, and has independently concluded that said facilities are acceptable for the storage and handling of products as provided for herein. Operator reserves the right at any time or times during the term of this Agreement to substitute other suitable premises and facilities in lieu of those designated herein for the storage and handling of Customer's products upon Customer's mutual consent. Customer further warrants and represents that Customer shall be the sole legal and beneficial owner of all products at any time delivered by Customer to the tanks, warehouse or other facilities herein provided for, and that all such products shall be free from all liens and encumbrances of any nature whatsoever until such products are delivered by Operator back to Customer from Operator's facilities hereunder.

PRODUCTS STORED: Customer shall use the facilities furnished hereunder for the storage and handling of only the product specified in the schedule attached hereto. Except for products described in said schedule, Customer shall not store and/or handle or cause to be stored and/or handled in any of these facilities (a) any product containing hydrogen sulphide or other corrosive materials, (b) any product which in any way would be injurious to any of 1 Athese facilities, or (c) any product which would render any of these facilities Junfit, after cold water rinse cleaning, for the proper storage and/or handling of water white oils. Customer shall at its sole cost and expense be responsible for any cleaning or the repair of damages resulting from the storage and/or

handling in any of these facilities of any product, which may not be stored and/or handled therein under the terms hereof.

- 3. SERVICES PROVIDED: Subject to the terms and conditions herein, Operator agrees to provide all labor and equipment necessary to receive the products specified in the attached schedule for storage and to remove them from storage for delivery as Customer may require. Provided that Operator shall not be obligated to provide equipment for receipt or delivery of products which is not already in place at the above described facility.
- 3.1 All services hereunder shall be provided as follows:
  - (a) Shipments to and from tank car and transport truck shall be performed during normal working hours; which shall be 8:00 a.m. to 4:30 p.m., Monday through Friday, holiday excepted. Tank cars and transport trucks shall be handled on a first arrival-first serve basis, but Operator is not liable for any delays or resulting damages caused thereby.
  - (b) There shall be no intra-terminal tank transfers (unless done for convenience of Operator pursuant to paragraph 1.1) and/or blending services performed by Operator other than that specifically provided for in the attached schedule.
- 3.2 Except as noted herein or in the attached schedule the services described in paragraph 3.1 shall be included in the facility fee set forth in the attached schedule, which fee shall be paid monthly in advance commencing on the first day of the term hereof unless otherwise provided in the schedule attached.
- Construction of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property of the property o
  - 3.3 Should Customer require services and Operator be able to provide same at other than the hours provided above, Customer agrees to pay to Operator, in addition to the facility fee; 1) a labor charge, which shall be \$18.63 per hour for normal working hours and \$26.16 per hour for overtime hours for each such man hour worked by employees of Operator, and 2) an overhead charge calculated at 10% of the labor charge. In the event that Operator's actual labor costs, increase during the term of this contract, Operator shall have the right to adjust the above labor charge to cover those costs upon notice to Customer. The term "actual labor costs" as used in this paragraph shall include wages, overtime, contributions to Social Security, Unemployment and Workmen's Compensation, and employee benefits.
    - 3.4 If this agreement is for a term greater than one year, the minimum facility fee and all other charges set forth in the attached schedule shall be adjusted annually on the anniversary date of the effective date of this agreement by multiplying the then current monthly facility fee and all other

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charges set forth in the attached schedule by a fraction of which the numerator is the U. S. Department of Labor's National Consumer Price Index for the month preceding the anniversary month and the denominator of which is the same index for the same month in the preceding year.

Operator shall perform the calculation necessary and determine any such increased fees and charges and shall notify Customer thereof. Until receipt of such notification from Operator and agreement by the Customer, Customer shall continue to pay the previously reflected monthly fees and charges. In the event that the U. S. Department of Labor's National Consumer Price Index shall have declined for any given period, the minimum facility fee and all other charges set forth in the attached schedule shall be adjusted accordingly as noted above.

If for any reason, the U. S. Department of Labor shall discontinue publication of the National Consumer Price Index during the term of this Agreement, the Operator shall give 30 days written notice to the Customer, of the use of an alternate index of changes in the general economy which would be applicable. If the Customer delivers to Operator a notice of rejection of the Operator's choice of an alternate index of changes in the general economy within 15 days from receipt by Customer of Operator's written notice thereof, both parties herein shall be bound by an index to be applied to the formula herein as determined by an independent commercial appraiser selected by both parties, with the costs of such determination to be borne equally by both parties.

- 3.5 Customer asserts no claim for the use of Operator's facilities except as expressly provided in this Agreement. Customer will use the tank car and transport truck facilities as hereinabove provided only for loading or unloading product into Operator's facilities and will not utilize said tank car or transport truck space before or beyond the period reasonably required for actual loading or unloading. All other areas are closed to Customer except when accompanied by a representative of Operator and upon Customer's execution of a Hold Harmless Agreement acceptable to Operator.
- 3.6 While on Operator's terminal premises, Customer will comply at all times with any and all rules established by Operator and with all governmental statues, ordinances, rules, regulations orders or requirements concerning air quality, water quality, or waste standards or controls imposed on or relating to the operation and use of the terminal facilities.
- 3.7 Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.

- ACCOUNTING FOR PRODUCT: The quantity of product received into or withdrawn from storage tanks shall be determined by Operator's representatives, or at Operator's election, a licensed inspector, by checking and gauging said tanks at the time of receipt or withdrawal of said product, but not more often than once per day. Customer may participate, but in the absence of such participation, gauges taken by Operator shall be presumed to be correct, unless such gauges can be proved to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually agreed upon calibration charts of the rail car or truck tanks. In the event of any disagreement as to quantities of material received or withdrawn, the issue shall, upon written notice of either party to the other be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, with the hearing to be held in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date of the conclusion of the proceedings, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto.
- 4.1 If requested by Customer, Operator will take samples from rail tank cars, automotive tank trucks and storage tanks and make such samples available to Customer at Operator's facilities hereunder. The cost of containers for such samples and all other expenses suffered by Operator in connection with the taking and delivery of samples, shall be paid to Operator by customer each month upon receipt of invoice from Operator. Samples shall be taken in accordance with reasonable procedures specified by Customer.
- 4.2 All quantities of product delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees fahrenheit (60°) in accordance with recognized temperature correction tables. The term "barrel" whenever used herein, means 42 U. S. gallons at sixty degrees fahrenheit.
- 5. TERMINATION DUE TO GOVERNMENT REGULATION: Should the County or City, in which Operator's facilities are located, or any other Governmental entity, local or federal, prohibit operation of any then existing facilities used in performing this Agreement, or in any way deprive Operator of the right to use the modification of such facilities or the construction of additional facilities to be used in performing this Agreement, this Agreement shall terminate at the option of Operator, unless Customer shall agree in writing within 15 days after receipt of Operator's written election to terminate this Agreement to pay for the cost of replacing any such facilities or property of which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such Governmental entity, on terms acceptable to Operator.

6. PAYMENT AND INTEREST FEE: Customer agrees that fees and charges not paid within 30 days after presentation of Operator's invoice shall be subject to 5/6 of 1% interest charge on the outstanding invoice balance. This monthly 5/6 of 1% charge is an interest feel and is not a remedy of an item of liquidated damages. All payments hereunder shall be made to Operator at its office at

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- P. O. Box 24447, Terminal Annex, Seattle, Washington 98124 or at such other place or places as Operator may notify Customer in writing.
- 7. DUTIES ON TERMINATION: Customer agrees upon expiration or termination of this Agreement to remove all of its material within a reasonable period of time, either bulk or packaged, from Operator's premises. All such material not removed within a reasonable period of time, shall at Operator's option become the property of Operator, and Operator may dispose of such material.
- 7.1 Customer shall be responsible for any and all costs incurred by Operator at the expiration of the term hereof in removal and disposal of material and cleaning said storage tank/tanks and the related facilities provided for hereunder, sufficient to put said tank/tanks and facilities back into clean petroleum service for unleaded products. Customer shall pay Operator immediately after presentation to Customer of invoice for all such cleaning costs. Cost for cleaning said tank/tanks and related facilities shall include, but not be limited to costs related to supplies, permits, use of equipment, labor and supervision. Tank rentals hereunder shall continue until such cleaning and disposal is accomplished.
- 7.2 LABOR DISPUTE: In the event of a labor dispute between the Customer and Customer's employees or any other third party and such labor dispute impacts or impairs the functioning and operations of Operator's facilities, the Operator has the right to immediately terminate this Agreement. Once the Agreement is terminated and notice is sent to the Customer, Customer has thirty (30) days to remove its product from Operator's facilities from receipt of notice.
  - LOSSES: Operator shall not be liable for normal losses due to spillage and evaporation during normal handling of products. Operator shall not be liable for any delay or nonperformance hereunder or for evaporation, shrinkage, line loss, clingage, discoloration, contamination, bacterial action destruction of the harbor or any of the facilities referred to herein when any of the foregoing is caused in whole or in part, by any act of God or public enemy, or by labor troubles, strikes, lockouts, nonavailability of labor, riots, fires, war, storms, explosions, breakdowns or machinery, railroad embargoes or interventions, failure or delay of manufacturers or of persons from whom Operator is obtaining machinery, equipment, materials or supplies to deliver the same, or other causes beyond its control, whether such other causes be the causes herein specifically provided for or not, and whether the cause is or is not existing on the date of this Agreement. Operator shall not, in any event, be liable for loss of or damage to Customer's property, except and only when caused by Operator's failure to use reasonable care in the safekeeping and handling of Customer's property and further provide that claim is made in writing within 30 days after receipt of actual or constructive notice of any such loss or damages. It is mutually understood that the Operator is not responsible for any changes in the quality of the product stored which might occur in storage due to the possible effect of air, light, temperature or other natural or chemical happenings.

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8.1 Losses of any product for which Operator is responsible hereunder shall be determined annually at the end of each year, commencing with the date of the first receipt of such product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals during the period for which the accounting is made, plus the stock on hand at the end of such period, from the sum of the total receipts during such period plus the stock on hand at the beginning of such period. Normal losses shall be presumed to be 3/4 of 1% per month of receipts plus maximum amounts in storage during the period for which accounting is made and such amounts shall be deducted from any claims for losses.

9. INSURANCE: Insurance, if any be desired by Customer, shall be carried by Customer at his own expense and for the benefit of both the Customer and Operator.

10. DEFAULT: Should Customer default at any time in the prompt payment of any of the monies due hereunder, or in the prompt performance and observance of any of the terms, or conditions of this Agreement, and should any such default, not relating to the payment of money, continue for thirty (30) days or more after written notice thereof by Operator to Customer, or should Customer go into bankruptcy voluntary or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly fee for the whole unexpired term hereof together with all other accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement. Customer hereby grants to Operator a security interest in all products at any time contained in the tanks, warehouse or other facilities herein provided for, as security for the payment of all the fees and other charges payable to Operator by Customer hereunder, and as security also, for the payment of all other obligations of Customer to Operator, whether now in existence or hereafter contracted or incurred; and upon any such default, Operator may, after 15 days notice by Operator to Customer, sell all or any portion of such products, at public or private sale, and Operator may be purchaser at such sale or sales. Customer agrees that by execution of this agreement Customer appoints and constitutes Operator as Customer's Attorney in Fact for the sole and limited purpose of executing on behalf of the Customer a financing statement evidencing such security interest in a form satisfactory for filing with the appropriate filing officer of the State of jurisdiction over Operator's facilities. Customer shall pay and indemnify Operator against all costs and charges, including reasonable attorney's fees, incurred by Operator for the sale of Customer's products as above provided, or for enforcement of any covenant or condition herein contained on the part of Customer to be kept or performed. The remedies of Operator herein provided for shall not be exclusive, but shall be cumulative and shall be in addition to all other remedies in its favor, at law or in equity.

10.1 The failure by Operator at any time to enforce any default or right reserved to it, or to require performance of any of the terms, covenants, or provisions hereof by Customer at any time designated, shall not be a waiver of

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any such default or right to which Operator is entitled, nor shall it in any way affect the right of Operator to enforce such provisions thereafter.

- 11. DAMAGES: In consideration of the rates for monthly fees and other charges set forth herein (it being recognized that higher charges would be made for the limitation of liability set forth in this paragraph) it is understood and agreed that Operator shall in no event be liable for more than actual cash value or \_\_\_\_\_ cents per gallon, whichever is less, for any product loss or damage. Operator shall not be liable for special or consequential damages, no matter how such loss or damage shall have occurred or been caused. Also, it is understood that to the extent that Customer has insurance reimbursing it for losses, Customer waives any claim or claims it may have against Operator on account for such losses.
- 12. ASSIGNMENT: This Agreement shall be binding upon and inure to the benefit of the successors and assigns of each of the parties hereto; provided, however, that Customer shall not transfer or assign this Agreement, in whole or part, without the prior written consent of Operator, and any such transfer or assignment made in violation of this paragraph shall be null and void and of no force or effect whatsoever.
- 13. This Agreement is complete and contains all warranties and representations which form the basis of this Agreement. There exist no other representations or warranties unless they are enumerated herein. No amendment or modification of this Agreement shall be effective or binding unless such modification is in a written form signed by both parties hereto.
- 14. Each numbered paragraph or clause herein to this Agreement stands on its own and if any numbered paragraph or clause is held to be invalid or unenforceable, such clause shall be held separated and severable from this Agreement and the remaining Agreement shall remain in full force and effect.
- 15. If a conflict arises between the specific meaning or application of a term, clause or paragraph of the Agreement language and the accompanying schedules; the language and specific meaning of the accompanying schedules shall control and be followed.
- 16. NOTICES: All notices from one party to the other shall be directed to the appropriate address below or such other address or addresses as either party shall notify the other in writing:

OPERATOR: Time Oil Co.

P. O. Box 24447, Terminal Annex, Seattle, WA 98124

CUSTOMER: Koppers Company, Inc.

5317 Southwest Avenue, St. Louis, Mo 63110

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IN WITNESS WHEREOF, this Agreement has been made and executed by the parties hereto as of the day, month and year first hereinabove written.

Attest:	OPERATOR: TIME OIL CO.
Secretary	By:its
	CUSTOMER: KOPPERS COMPANY, INC.
Secretary	By:
secretary	105

SCHEDULE TO STORAGE AND CONCENTRATE DILUTION AGREEMENT
--------------------------------------------------------

DATE

TERMINAL:

12005 North Burgard, Portland, Oregon

CUSTOMER:

Koppers Company, Inc.

COMMODITIES

TO BE STORED:

Woodtox Concentrate, wax, mineral spirits for wood preservatives and the finished products for wood

preservatives.

TERM:

3 years

STORAGE TANKS:

Mineral Spirits 38009
Woodtox Concentrate T-1-7 20001
Woodtox Preprime RTU 13001

Woodtox Preprime RTU

Koppers -3 - 8,000

1 - 6,0001 - 3,000

FACILITY FEE:

\$700/month

ADDITIONAL CHARGES:

\$0.0500 per gallon for each gallon Woodtox Concentrate T-1-7 received in railcar. This includes adding the wax and mineral spirits to make Woodtox Preprime RTU.

\$0.0036 per gallon - bulk T/T loading of Woodtox

Preprime RTU.

\$0.0730 per gallon - drum filling of Woodtox Preprime

RTU.

\$0.7500 per drum in and \$0.7500 per drum out for

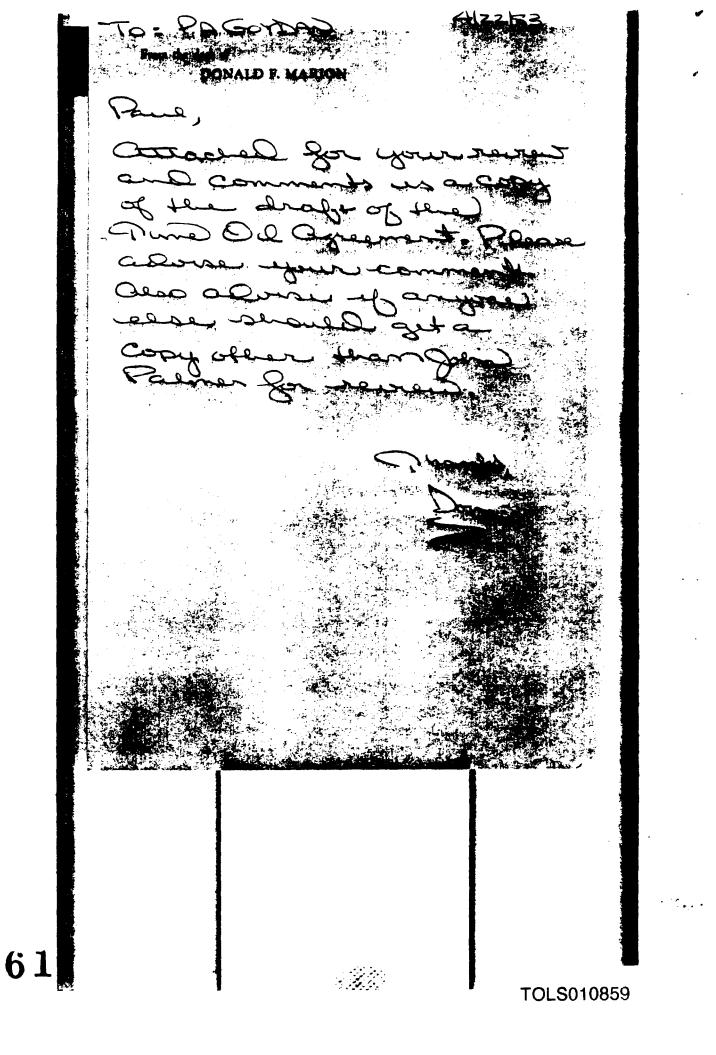
prepackaged finish goods products produced by Koppers.

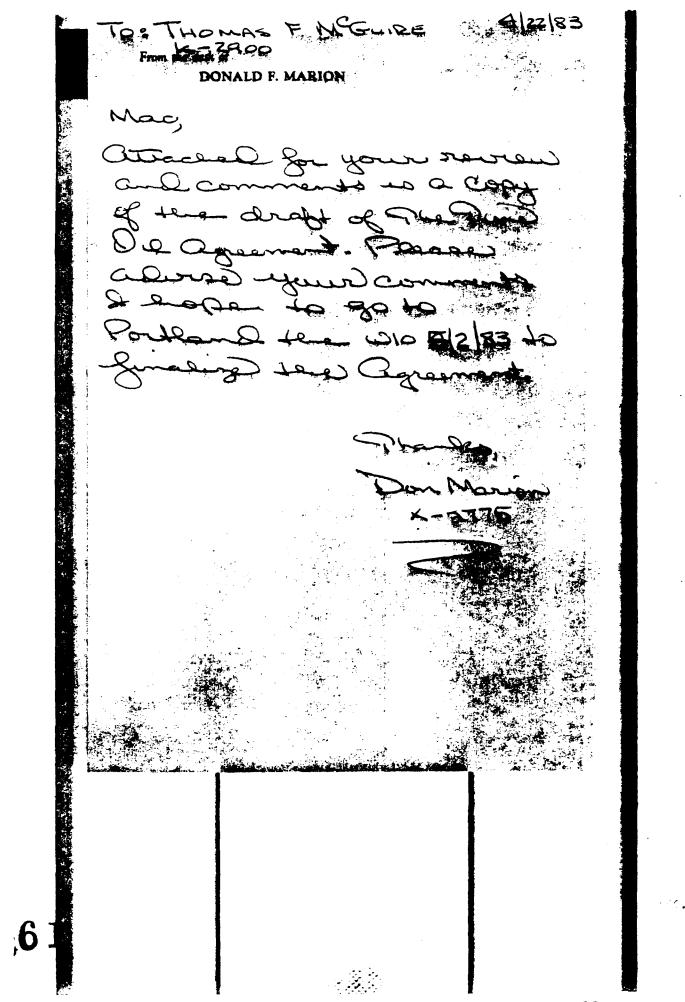
SPECIAL PROVISIONS:

Operator shall blend or mix the above referenced products at temperatures not to exceed 180°F.

Mineral Spirits - for resale \$0.0300 per gallon - total thru put charge.

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STORAGE AND LICENSE AGREEMENT

THIS AGREEMENT, made and entered into this \_\_\_\_\_\_ day of \_\_\_\_\_\_ 19 \_\_\_\_, by and between TIME OIL CO. (hereinafter referred to as "Operator"), a corporation incorporated and existing under the laws of the State of Washington and KOPPERS COMPANY, INC. (hereinafter referred to as "Customer"), a corporation organized and existing under the laws of the State of Delaware.

WHEREAS, Operator is the owner of certain terminal \*sturage\* facilities and whereas, Customer desires to obtain permission to place its hereinafter described products therein; the parties hereto agree as follows:

Customer warrants that he has examined and inspected Operator's tanks, pipelines and equipment and the rail and truck facilities, and that Customer is fully aware of the limitations and condition thereof, and has independently concluded that said facilities are acceptable for the storage and handling of products as provided for herein. Operator reserves the right at any time or times during the term of this Agreement to substitute other suitable premises and facilities in lieu of those designated herein for the storage and handling of Customer's products. Customer further warrants and represents that Customer shall be the sole legal and beneficial owner of all products at any time delivered by Customer to the tanks, warehouse or other facilities herein provided for, and that all such products shall be free from all liens and encumbrances of any nature whatsoever until such products are delivered by Operator back to Customer from Operator's facilities hereunder.

- 2. PRODUCTS STORED: Customer shall use the facilities furnished hereunder for the storage and handling of only the products specified in the schedule attached hereto. Except for products described in said schedule, Customer shall not store and/or handle or cause to be stored and/or handled in any of these facilities (a) any product containing hydrogen sulphide or other corrosive materials, (b) any product which in any way would be injurious to any of these facilities, or (c) any product which would render any of these facilities unfit, after cold water rinse cleaning, for the proper storage and/or handling of water white oils. Customer shall at its sole cost and expense be responsible for any cleaning or the repair of damages resulting from the storage and/or handling in any of these facilities of any product, which may not be stored and/or handled therein under the terms hereof.
- 3. <u>SERVICES PROVIDED</u>: Subject to the terms and conditions herein, Operator agrees to provide all labor and equipment necessary to receive the products specified in the attached schedule for storage and to remove them from storage for delivery as Customer may require. Provided that Operator shall not be obligated to provide equipment for receipt or delivery of products which is not already in place at the above described facility.
- 3.1 All services hereunder shall be provided as follows:
  - (a) Shipments to and from tank car and transport truck shall be performed during normal working hours; which shall be 8:00 a.m. to 4:30 p.m., Monday through friday, holidays excepted. Tank cars and transport trucks shall be handled on a first arrival-first serve basis, but Operator is not liable for any delays or resulting damages caused thereby.

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- (b) There shall be no intra-terminal tank transfers, (unless done for convenience of Operator pursuant to paragraph (and/or blending services performed by Operator other than that specifically provided for in the attached schedule.
- 3.2 Except as noted herein or in the attached schedule the services described in paragraph 3.1 shall be included in the minimum terrice fee set forth in the attached schedule, which fee shall be paid monthly in advance commencing on the first day of the term hereof unless otherwise provided in the schedule attached.
- 3.3 Should Customer require services and Operator be able to provide same at other than the hours provided above, Customer agrees to pay to Operator, in addition to the minimum service fee; 1) a labor charge, which shall be \$18.63 per hour for normal working hours and \$26.16 per hour for overtime hours for each such man hour worked by employees of Operator, and 2) an overhead charge calculated at 10% of the labor charge. In the event that Operator's actual labor costs, increase during the term of this contract, Operator shall have the right to adjust the above labor charge to cover those costs upon notice to Customer. The term "actual labor costs" as used in this paragraph shall include wages, overtime, contributions to Social Security, Unemployment and Workmen's Compensation, and employee benefits.
- 3.4 If this agreement is for a term greater than one year, the minimum secretary service fee and all other charges set forth in the attached schedules shall be adjusted annually on the anniversary date of the effective date of this agreement by multiplying the then current monthly weare and all other charges set forth in the attached schedules by a fraction of which the numerator is the U.S. Department of Labor's National Consumer Price Index for the month preceding the anniversary month and the denominator of which is the same index for the same month in the preceding year.

Operator shall perform the calculation necessary and determine any such increased fees and charges and shall notify Customer thereof. Intil receipt of such notification from Operator, Customer shall continue to pay the previously reflected monthly fees and charges and shall pay any excess upon later notification. In the event that the U.S. Department of Labor's National Consumer Price Index shall have declined for any given period, the minimum service fee and all other charges set forth in the attached schedules shall be the same fees and charges as for that preceding month.

If for any reason, the U.S. Department of Labor shall discontinue publication of the National Consumer Price Index during the term of this Agreement, the Operator shall give 30 days written notice to the Customer, of the use of an alternate index of changes in the general economy which would be applicable. If the Customer delivers to Operator a notice of rejection of the Operator's choice of an alternate index of changes in the general economy within 15 days from receipt by Customer of Operator's written notice thereof, both parties herein shall be bound by an index to be applied to the formula herein as determined by an independent commercial appraiser selected by both parties, with the costs of such determination to be borne equally by both parties.

- 3.5 Customer asserts no claim for the use of Operator's facilities except as expressly provided in this Agreement. Customer will use the tank car and transport truck facilities as hereinabove provided only for loading or unloading product into Operator's facilities and will not utilize said tank car or transport truck space before or beyond the period reasonably required for actual loading or unloading. All other areas are closed to Customer except when accompanied by a representative of Operator and upon Customer's execution of a Hold Harmless Agreement acceptable to Operator.
- 3.6 While on Operator's terminal premises, Customer shall comply at all times with any and all rules established by Operator and with all governmental statutes, ordinances, rules, regulations orders or requirements concerning air quality, water quality, or waste standards or controls imposed on or relating to the operation and use of the terminal facilities.

- 3.7 Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.
- 4. ACCOUNTING FOR PRODUCT: The quantity of product received into or withdrawn from storage tanks shall be determined by Operator's representatives, or at Operator's election, a licensed inspector, by checking and gauging said tanks at the time of receipt or withdrawal of said product, but not more often than once per day. Customer may participate, but in the absence of such participation, gauges taken by Operator shall be presumed to be correct, unless such gauges can be proved to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually agreed upon calibration charts of the rail car or truck tanks. In the event of any disagreement as to quantities of material received or withdrawn, the issue shall, upon written notice of either party to the other be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, with the hearing to be held in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date of the conclusion of the proceedings, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto.
- 4.1 If requested by Customer, Operator will take samples from stripes, barges, rail tank cars, automotive tank trucks and storage tanks and make such samples available to Customer at Operator's facilities hereunder. The cost of containers for such samples and all other expenses suffered by Operator in connection with the taking and delivery of samples, shall be paid to Operator by Customer each month upon receipt of invoice from Operator. Samples shall be taken in accordance with reasonable procedures specified by Customer.
- 4.2 All quantities of product delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees fahrenheit ( $60^{\circ}$ ) in accordance with recognized temperature correction tables. The term "barrel" whenever used herein, means 42 U.S. gallons at sixty degrees fahrenheit.
- 5. TERMINATION DUE TO GOVERNMENT REGULATION: Should the County or City, in which Operator's facilities are located, or any other Governmental entity, local or federal, prohibit operation of any then existing facilities used in performing this Agreement, or in any way deprive Operator of the right to use any such facilities or provide services in connection therewith, or require the modification of such facilities or the construction of additional facilities to be used in performing this Agreement, this Agreement shall terminate at the option of Operator, unless Customer shall agree in writing within 15 days after receipt of Operator's written election to terminate this Agreement to pay for the cost of replacing any such facilities or property of which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such Governmental entity, on terms acceptable to Operator.
- 6. PAYMENT AND INTEREST FEE: Customer agrees that fees and charges not paid within 30 days after presentation of Operator's invoice shall be subject to 5/6 of 1% interest charge on the outstanding invoice balance. This monthly 5/6 of 1% charge is an interest fee and is not a remedy or an item of liquidated damages. All payments hereunder shall be made to Operator at its office at P.O. Box 24447, Terminal Annex, Seattle, Washington 98124 or at such other place or places as Operator may notify Customer in writing.
- 7. <u>DUTIES ON TERMINATION</u>: Customer agrees promptly upon expiration or termination of this Agreement to remove all of its material, either bulk or packaged, from Operator's premises. All such material not removed at the expiration or termination of this agreement shall am at Operator's option become the property of Operator, and Operator may dispose of such material.
- 7.1 Customer shall be responsible for any and all costs incurred by Operator at the expiration of the term hereof in removal and disposal of material and cleaning said storage tank/tanks and the related facilities provided for

hereunder, sufficient to put said tank/tanks and facilities back into clean petroleum service for unleaded products. Customer shall pay Operator immediately after presentation to Customer of invoice for all such cleaning costs. Cost for cleaning said tank/tanks and related facilities shall include, but not be limited to costs related to supplies, permits, use of equipment, labor and supervision. Tank rentals hereunder shall continue until such cleaning and disposal is accomplished.

- 7.2 LABOR DISPUTE: In the event of a labor dispute between the Customer and Customer's employees or any other third party and such labor dispute impacts or impairs the functioning and operations of Operator's facilities, the Operator has the right to immediately terminate this Agreement. Once the Agreement is terminated and notice is sent to the Customer, Customer has thirty (30) days to remove its product from Operator's facilities from receipt of notice.
- LOSSES: Operator shall not be liable for normal losses due to spillage and evaporation during normal handling of products. Operator shall not be liable for any delay or nonperformance hereunder or for evaporation. shrinkage, line loss, clingage, discoloration, contamination, bacterial action damage to or destruction of any property of Customer, or damage to, or destruction of the harbor or any of the facilities referred to herein when any of the foregoing is caused in whole or in part, by any act of God or public enemy, or by labor troubles, strikes, lockouts, nonavailability of labor, riots, fires, war, storms, explosions, breakdowns or machinery, railroad embargoes or interventions, failure or delay of manufacturers or of persons from whom Operator is obtaining machinery, equipment, materials or supplies to deliver the same, or other causes beyond its control, whether such other causes be the causes herein specifically provided for or not, and whether the cause is or is not existing on the date of this Agreement. Operator shall not, in any event, be liable for loss of or damage to Customer's property, except and only when caused by Operator's failure to use reasonable care in the safekeeping and handling of Customer's property and further provided that claim is made in writing within 30 days after receipt of actual or constructive notice of any such loss or damages. It is mutually understood that the Operator is not responsible for any changes in the quality of the product stored which might occur in storage due to the possible effect of air, light, temperature or other natural or chemical happenings.
- B.l Losses of any product for which Operator is responsible hereunder shall, be determined annually at the end of each year, commencing with the date of the first receipt of such product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals during the period for which the accounting is made, plus the stock on hand at the end of such period, from the sum of the total receipts during such period plus the stock on hand at the beginning of such period. Normal losses shall be presumed to be 3/4 of 1% per month of receipts plus maximum amounts in storage during the period for which accounting is made and such amounts shall be deduted from any claims for losses.
- 8.8 SPILLS: It is mutually understood that Operator is a member of a cooperative which provides and maintains manpower and equipment for use in cleaning up makine spills of product. The members of said cooperative are assessed periodically for costs incurred by the cooperative based upon the volume of product loaded or unloaded from vessels. Should Operator's assessment by the cooperative increase as a result of volumes of product handled pursuant to this agreement, sustomer agrees to reimburse Operator for such increase. Operator shall be responsible for all cleanup costs and fines resulting from spills which occur shoreward of the flange connecting the shorelines to the vessel of the lines are provided by Operator and shoreward of the flange connecting the vessel's lines to the shore facilities of the lines are provided by the vessel. Customer shall be responsible for all cleanup costs and fines resulting from spills by the vessel and waterward of the flanges specified above.
- 9. <u>INSURANCE</u>: Insurance, if any be desired by Customer, shall be carried by Customer at his own expense and for the benefit of both the Customer and Operator.

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- DEFAULT: Should Customer default at any time in the prompt payment of any of the monies due hereunder, or in the prompt performance and observance of any of the terms, or conditions of this trease Agreement, and should any such default, not relating to the payment of money, continue for thirty (30) days or more after written notice thereof by Operator to Customer, or should Customer go into bankruptcy voluntary or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly fee for the whole unexpired term hereof together with all other accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement. Customer hereby grants to Operator a security interest in all products at any time contained in the tanks, warehouse or other facilities herein provided for, as security for the payment of all the fees and other charges payable to Operator by Customer hereunder, and as security also, for the payment of all other obligations of Customer to Operator, whether now in existence or hereafter contracted or incurred; and upon any such default, Operator may, after 15 days notice by Operator to Customer, sell all or any portion of such products, at public or private sale, and Operator may be purchaser at such sale or sales. Customer agrees that by execution of this agreement Customer appoints and constitutes Operator as Customer's Attorney in Fact for the sole and limited purpose of executing on behalf of the Customer a financing statement evidencing such security interest in a form satisfactory for fliing with the appropriate filling officer of the State of jurisdiction over Operator's facilities. Customer shall pay and indemnify Operator against all costs and charges, including reasonable attorney's fees, incurred by Operator for the sale of Customer's products as above provided, or for enforcement of any covenant or condition herein contained on the part of Customer to be kept or performed. The remedies of Operator herein provided for shall not be exclusive, but shall be cumulative and shall be in addition to all other remedies in its favor, at law or in equity.
- 10.1 The failure by Operator at any time to enforce any default or right reserved to it, or to require performance of any of the terms, covenants, or provisions hereof by Customer at any time designated, shall not be a waiver of any such default or right to which Operator is entitled, nor shall it in any way affect the right of Operator to enforce such provisions thereafter.
- 11. <u>DAMAGES</u>: In consideration of the rates for monthly fees and other charges set forth herein (it being recognized that higher charges would be made but for the limitation of liability set forth in this paragraph) it is understood and agreed that Operator shall in no event be liable for more than actual cash value or \_\_\_\_\_ cents per gallon, whichever is less, for any product loss or damage. Operator shall not be liable for special or consequential damages, no matter how such loss or damage shall have occurred or been caused. Also, it is understood that to the extent that Customer has insurance reimbursing it for losses, Customer waives any claim or claims it may have against Operator on account for such losses.
- 12. <u>COMMON USE OF PIPELINES</u>: Customer understands that Operator may use the pipelines which are common multi-product clean lines that connect Operator's tanks to the dock and truck leading facilities for clean petroleum and chemical products not belonging to Customer. Customer hereby approves such usage and releases Operator from any liability in connection therewith.
- 12. ASSIGNMENT: This Agreement shall be binding upon and inure to the benefit of the successors and assigns of each of the parties hereto; provided however, that Customer shall not transfer or assign this Agreement, in whole or part, without the prior written consent of Operator, and any such transfer or assignment made in violation of this paragraph shall be null and void and of no force or effect whatsoever.
- This Agreement is complete and contains all warranties and representations which form the basis of this Agreement. There exist no other representations or warranties unless they are enumerated herein. No amendment or modification of this Agreement shall be effective or binding unless such modification is in a written form signed by both parties hereto.

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- which large such numbered paragraph or clause herein to this Agreement stands on its own and if any numbered paragraph or clause is held to be invalid or unenforceable, such clause shall be held separated and severable from this Agreement and the remaining Agreement shall remain in full force and effect.
- 16. If a conflict arises between the specific meaning or application of a term, clause or paragraph of the Agreement language and the accompanying schedules; the language and specific meaning of the accompanying schedules shall control and be followed.
- MOTICES: All notices from one party to the other shall be directed to the appropriate address below or such other address or addresses as either party shall notify the other in writing:

OPERATOR: Time 011 Co.

P.O. Box 24447, Terminal Annex, Seattle, WA 98124

CUSTOMER: Wood Treating Chemicals Co.

5137 Southwest Avenue, St. Louis, MO 63110

18. <u>DTHER CHARGES:</u> All tolls, charges and taxes for pipelines, wharfage and dock services shall be for the account of Customer. The wharfage and dockage fees shall be as posted by Portland Dock & Wharfage from time to time.

IN WITNESS WHEREOF, this Agreement has been made and executed by the parties hereto as of the day, month and year first hereinabove written.

Attest: OPERATOR: TIME OIL CO.

By:

1ts

CUSTOMER: KOPPERS COMPANY, INC.

By:

1ts

1ts

TERMINAL:

12005 North Burgard, Portland, Oregon

CUSTOMER:

Koppers Company, Inc.

COMMODITIES TO BE STORED: Woodlox concentrate, way, muneral spirato Raw materion for wood preservatives and the finished product

ر پېښې preservatives.'

TERM:

STORAGE TANKS:

Nos. 38009, 20001, 20002, 20003, 13001, 7804, 8005,

8006, 6007 and 6008

1-3,000

MINIMUM SERVICE TEE:

Facily Fee = \$ 700/mo.

ADDITIONAL CHARGES: \$0.0500 per gallon for each gallon of pentapetroleum or EST type solutions blended and shipped. These include

Woodlox Preprime Rives to whake woodlow Prague

Woodlox Preprime Rives to whake woodlow Prague

For gallon for each gallon of concentrate it.

Type solutions blended and shipped. These include

Customer products known as:

Custmers products known as:

Petroset II WR 80 Concentrate WR 340 Concentrate Timbertox 40 Concentrate **Hood**tox 140 Concentrate Woodtox Preprime Concentrate

# 0.0730/gal - Drum Folling of Woodbox Programs \$0.7500 per drum in -0.7500 per

\$ 00130 per 55 gailon drum for each drum filled. provided Koppers.

per drum for each drum of prepackaged naterial shipped.

SPECIAL PROVISIONS: Operator shall blend or mix the above referenced products at temperatures not to exceed 180° F.

Mineral Sports-For resale - 40.030 del-

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### DRAFT

#### STORAGE AND CONCENTRATE DILUTION AGREEMENT

THIS AGREEMENT, made and entered into this day of
19 , by and between TIME OIL CO. (hereinafter referred to as
"Operator"), a corporation incorporated and existing under the laws of the
State of Washington and KOPPERS COMPANY, INC. (hereinafter referred to as
"Customer"), a corporation organized and existing under the laws of the State
of Delaware.

WHEREAS, Operator is the owner of certain terminal facilities and whereas, Customer desires to obtain permission to place its hereinafter described products therein; the parties hereto agree as follows:

- 1. FACILITIES AND TERM: Operator does hereby agree to provide and Customer does hereby agree to accept certain terminal facilities and handling services, at 12005 North Burgard, Portland, Oregon as set forth in the schedule attached, and as hereinafter provided. This agreement shall be for a term of 3 years, beginning on the 1st day of May, 1983, and continuing through the 30th day of April, 1986.
- l.l Customer warrants that he has examined and inspected Operator's tanks, pipelines and equipment and the rail and truck facilities, and that Customer is fully aware of the limitations and condition thereof, and has independently concluded that said facilities are acceptable for the storage and handling of products as provided for herein. Operator reserves the right at any time or times during the term of this Agreement to substitute other suitable premises and facilities in lieu of those designated herein for the storage and hand'ing of Customer's products upon Customer's mutual consent. Customer further warrants and represents that Customer shall be the sole legal and beneficial owner of all products at any time delivered by Customer to the tanks, warehouse or other facilities herein provided for, and that all such products shall be free from all liens and encumbrances of any nature whatsoever until such products are delivered by Operator back to Customer from Operator's facilities hereunder.
- 2. PRODUCTS STORED: Customer shall use the facilities furnished hereunder for the storage and handling of only the product specified in the schedule attached hereto. Except for products described in said schedule, Customer shall not store and/or handle or cause to be stored and/or handled in any of these facilities (a) any product containing hydrogen sulphide or other corrosive materials, (b) any product which in any way would be injurious to any of these facilities, or (c) any product which would render any of these facilities unfit, after cold water rinse cleaning, for the proper storage and/or handling of water white oils. Customer shall at its sole cost and expense be responsible for any cleaning or the repair of damages resulting from the storage and/or

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handling in any of these facilities of any product, which may not be stored and/or handled therein under the terms hereof.

- 3. <u>SERVICES PROVIDED</u>: Subject to the terms and conditions herein, Operator agrees to provide all labor and equipment necessary to receive the products specified in the attached schedule for storage and to remove them from storage for delivery as Customer may require. Provided that Operator shall not be obligated to provide equipment for receipt or delivery of products which is not already in place at the above described facility.
- 3.1 All services hereunder shall be provided as follows:
  - (a) Shipments to and from tank car and transport truck shall be performed during normal working hours; which shall be 8:00 a.m. to 4:30 p.m., Monday through Friday, holiday excepted. Tank cars and transport trucks shall be handled on a first arrival-first serve basis, but Operator is not liable for any delays or resulting damages caused thereby.
  - (b) There shall be no intra-terminal tank transfers (unless done for convenience of Operator pursuant to paragraph 1.1) and/or blending services performed by Operator other than that specifically provided for in the attached schedule.
- 3.2 Except as noted herein or in the attached schedule the services described in paragraph 3.1 shall be included in the facility fee set forth in the attached schedule, which fee shall be paid monthly in advance commencing on the first day of the term hereof unless otherwise provided in the schedule attached.
- 3.3 Should Customer require services and Operator be able to provide same at other than the hours provided above, Customer agrees to pay to Operator, in addition to the facility fee; 1) a labor charge, which shall be \$18.63 per hour for normal working hours and \$26.16 per hour for overtime hours for each such man hour worked by employees of Operator, and 2) an overhead charge calculated at 10% of the labor charge. In the event that Operator's actual labor costs, increase during the term of this contract, Operator shall have the right to adjust the above labor charge to cover those costs upon notice to Customer. The term "actual labor costs" as used in this paragraph shall include wages, evertime, contributions to Social Security, Unemployment and Workmen's Compensation, and employee benefits.
- 3.4 If this agreement is for a term greater than one year, the minimum facility fee and all other charges set forth in the attached schedule shall be adjusted annually on the anniversary date of the effective date of this agreement by multiplying the then current monthly facility fee and all other

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charges set forth in the attached schedule by a fraction of which the numerator is the U. S. Department of Labor's National Consumer Price Index for the month preceding the anniversary month and the denominator of which is the same index for the same month in the preceding year.

Operator shall perform the calculation necessary and determine any such increased fees and charges and shall notify Customer thereof. Until receipt of such notification from Operator and agreement by the Customer, Customer shall continue to pay the previously reflected monthly fees and charges. In the event that the U. S. Department of Labor's National Consumer Price Index shall have declined for any given period, the minimum facility fee and all other charges set forth in the attached schedule shall be adjusted accordingly as noted above.

If for any reason, the U. S. Department of Labor shall discontinue publication of the National Consumer Price Index during the term of this Agreement, the Operator shall give 30 days written notice to the Customer, of the use of an alternate index of changes in the general economy which would be applicable. If the Customer delivers to Operator a notice of rejection of the Operator's choice of an alternate index of changes in the general economy within 15 days from receipt by Customer of Operator's written notice thereof, both parties herein shall be bound by an index to be applied to the formula herein as determined by an independent commercial appraiser selected by both parties, with the costs of such determination to be borne equally by both parties.

- 3.5 Customer asserts no claim for the use of Operator's facilities except as expressly provided in this Agreement. Customer will use the tank car and transport truck facilities as hereinabove provided only for loading or unloading product into Operator's facilities and will not utilize said tank car or transport truck space before or beyond the period reasonably required for actual loading or unloading. All other areas are closed to Customer except when accompanied by a representative of Operator and upon Customer's execution of a Hold Harmless Agreement acceptable to Operator.
- 3.6 While on Operator's terminal premises, Customer will comply at all times with any and all rules established by Operator and with all governmental statues, ordinances, rules, regulations orders or requirements concerning air quality, water quality, or waste standards or controls imposed on or relating to the operation and use of the terminal facilities.
- 3.7 Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.

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- ACCOUNTING FOR PRODUCT: The quantity of product received into or withdrawn from storage tanks shall be determined by Operator's representatives, or at Operator's election, a licensed inspector, by checking and gauging said tanks at the time of receipt or withdrawal of said product, but not more often than once per day. Customer may participate, but in the absence of such participation, gauges taken by Operator shall be presumed to be correct, unless such gauges can be proved to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually agreed upon calibration charts of the rail car or truck tanks. In the event of any disagreement as to quantities of material received or withdrawn, the issue shall, upon written notice of either party to the other be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, with the hearing to be held in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date of the conclusion of the proceedings, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto.
- 4.1 If requested by Customer, Operator will take samples from rail tank cars, automotive tank trucks and storage tanks and make such samples available to Customer at Operator's facilities hereunder. The cost of containers for such samples and all other expenses suffered by Operator in connection with the taking and delivery of samples, shall be paid to Operator by customer each month upon receipt of invoice from Operator. Samples shall be taken in accordance with reasonable procedures specified by Customer.
- 4.2 All quantities of product delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees fahrenheit (60°) in accordance with recognized temperature correction tables. The term "barrel" whenever used herein, means 42 U. S. gallons at sixty degrees fahrenheit.
- 5. TERMINATION DUE TO GOVERNMENT REGULATION: Should the County or City, in which Operator's facilities are located, or any other Governmental entity, local or federal, prohibit operation of any then existing facilities used in performing this Agreement, or in any way deprive Operator of the right to use the modification of such facilities or the construction of additional facilities to be used in performing this Agreement, this Agreement shall terminate at the option of Operator, unless Customer shall agree in writing within 15 days after receipt of Operator's written election to terminate this Agreement to pay for the cost of replacing any such facilities or property of which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such Governmental entity, on terms acceptable to Operator.
- 6. PAYMENT AND INTEREST FEE: Customer agrees that fees and charges not paid within 30 days after presentation of Operator's invoice shall be subject to 5/6 of 1% interest charge on the outstanding invoice balance. This monthly 5/6 of 1% charge is an interest feel and is not a remedy of an item of liquidated damages. All payments hereunder shall be made to Operator at its office at

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- P. O. Box 24447, Terminal Annex, Seattle, Washington 98124 or at such other place or places as Operator may notify Customer in writing.
- DUTIES ON TERMINATION: Customer agrees upon expiration or termination of this Agreement to remove all of its material within a reasonable period of time, either bulk or packaged, from Operator's premises. All such material not removed within a reasonable period of time, shall at Operator's option become the property of Operator, and Operator may dispose of such material.
- 7.1 Customer shall be responsible for any and all costs incurred by Operator at the expiration of the term hereof in removal and disposal of material and cleaning said storage tank/tanks and the related facilities provided for hereunder, sufficient to put said tank/tanks and facilities back into clean petroleum service for unleaded products. Customer shall pay Operator immediately after presentation to Customer of invoice for all such cleaning costs. Cost for cleaning said tank/tanks and related facilities shall include, but not be limited to costs related to supplies, permits, use of equipment, labor and supervision. Tank rentals hereunder shall continue until such cleaning and disposal is accomplished.
- 7.2 LABOR DISPUTE: In the event of a labor dispute between the Customer and Customer's employees or any other third party and such labor dispute impacts or impairs the functioning and operations of Operator's facilities, the Operator has the right to immediately terminate this Agreement. Once the Agreement is terminated and notice is sent to the Customer, Customer has thirty (30) days to remove its product from Operator's facilities from receipt of notice.
- LOSSES: Operator shall not be liable for normal losses due to spillage and evaporation during normal handling of products. Operator shall not be liable for any delay or nonperformance hereunder or for evaporation, shrinkage, line loss, clingage, discoloration, contamination, bacterial action destruction of the harbor or any of the facilities referred to herein when any of the foregoing is caused in whole or in part, by any act of God or public enemy, or by labor troubles, strikes, lockouts, nonavailability of labor, riots, fires, war, storms, explosions, breakdowns or machinery, railroad embargoes or interventions, failure or delay of manufacturers or of persons from whom Operator is obtaining machinery, equipment, materials or supplies to deliver the same, or other causes beyond its control, whether such other causes be the causes herein specifically provided for or not, and whether the cause is or is not existing on the date of this Agreement. Operator shall not, in any event, be liable for loss of or damage to Customer's property, except and only when caused by Operator's failure to use reasonable care in the safekeeping and handling of Customer's property and further provide that claim is made in writing within 30 days after receipt of actual or constructive notice of any such loss or damages. It is mutually understood that the Operator is not responsible for any changes in the quality of the product stored which might occur in storage due to the possible effect of air, light, temperature or other natural or chemical happenings.

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- 8.1 Losses of any product for which Operator is responsible hereunder shall be determined annually at the end of each year, commencing with the date of the first receipt of such product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals during the period for which the accounting is made, plus the stock on hand at the end of such period, from the sum of the total receipts during such period plus the stock on hand at the beginning of such period. Normal losses shall be presumed to be 3/4 of 1% per month of receipts plus maximum amounts in storage during the period for which accounting is made and such amounts shall be deducted from any claims for losses.
- 9. <u>INSURANCE</u>: Insurance, if any be desired by Customer, shall be carried by Customer at his own expense and for the benefit of both the Customer and Operator.
- 10. DEFAULT: Should Customer default at any time in the prompt payment of any of the monies due hereunder, or in the prompt performance and observance of any of the terms, or conditions of this Agreement, and should any such default, not relating to the payment of money, continue for thirty (30) days or more after written notice thereof by Operator to Customer, or should Customer go into bankruptcy voluntary or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly fee for the whole unexpired term hereof together with all other accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement. Customer hereby grants to Operator a security interest in all products at any time contained in the tanks, warehouse or other facilities herein provided for, as security for the payment of all the fees and other charges payable to Operator by Customer hereunder, and as security also, for the payment of all other obligations of Customer to Operator, whether now in existence or hereafter contracted or incurred; and upon any such default, Operator may, after 15 days notice by Operator to Customer, sell all or any portion of such products, at public or private sale, and Operator may be purchaser at such sale or sales. Customer agrees that by execution of this agreement Customer appoints and constitutes Operator as Customer's Attorney in Fact for the sole and limited purpose of executing on behalf of the Customer a financing statement evidencing such security interest in a form satisfactory for filing with the appropriate filing officer of the State of jurisdiction over Operator's facilities. Customer shall pay and indemnify Operator against all costs and charges, including reasonable attorney's fees, incurred by Operator for the sale of Customer's products as above provided, or for enforcement of any covenant or condition herein contained on the part of Customer to be kept or performed. The remedies of Operator herein provided for shall not be exclusive, but shall be cumulative and shall be in addition to all other remedies in its favor, at law or in equity.
- 10.1 The failure by Operator at any time to enforce any default or right reserved to it, or to require performance of any of the terms, covenants, or provisions hereof by Customer at any time designated, shall not be a waiver of

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any such default or right to which Operator is entitled, nor shall it in any way affect the right of Operator to enforce such provisions thereafter.

- 11. <u>DAMAGES</u>: In consideration of the rates for monthly fees and other charges set forth herein (it being recognized that higher charges would be made for the limitation of liability set forth in this paragraph) it is understood and agreed that Operator shall in no event be liable for more than actual cash value or \_\_\_\_\_ cents per gallon, whichever is less, for any product loss or damage. Operator shall not be liable for special or consequential damages, no matter how such loss or damage shall have occurred or been caused. Also, it is understood that to the extent that Customer has insurance reimbursing it for losses, Customer waives any claim or claims it may have against Operator on account for such losses.
- 12. ASSIGNMENT: This Agreement shall be binding upon and inure to the benefit of the successors and assigns of each of the parties hereto; provided, however, that Customer shall not transfer or assign this Agreement, in whole or part, without the prior written consent of Operator, and any such transfer or assignment made in violation of this paragraph shall be null and void and of no force or effect whatsoever.
- 13. This Agreement is complete and contains all warranties and representations which form the basis of this Agreement. There exist no other representations or warranties unless they are enumerated herein. No amendment or modification of this Agreement shall be effective or binding unless such modification is in a written form signed by both parties hereto.
- 14. Each numbered paragraph or clause herein to this Agreement stands on its own and if any numbered paragraph or clause is held to be invalid or unenforceable, such clause shall be held separated and severable from this Agreement and the remaining Agreement shall remain in full force and effect.
- 15. If a conflict arises between the specific meaning or application of a term, clause or paragraph of the Agreement language and the accompanying schedules; the language and specific meaning of the accompanying schedules shall control and be followed.
- 16. NOTICES: All notices from one party to the other shall be directed to the appropriate address below or such other address or addresses as either party shall notify the other in writing:

OPERATOR: Time Oil Co.
P. O. Box 24447, Terminal Annex, Seattle, WA 98124

CUSTOMER: Koppers Company, Inc.
5317 Southwest Avenue, St. Louis, Mo 63110

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IN WITNESS WHEREOF, this Agreement has been made and executed by the parties hereto as of the day, month and year first hereinabove written.

Attest:	OPERATOR: TIME OIL CO.
Secretary	By:
	CUSTOMER: KOPPERS COMPANY, INC
	By:
Secretary	its

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# SCHEDULE TO STORAGE AND CONCENTRATE DILUTION AGREEMENT

DATE

TERMINAL:

12005 North Burgard, Portland, Oregon

**CUSTOMER:** 

Koppers Company, Inc.

COMMODITIES

TO BE STORED:

Woodtox Concentrate, wax, mineral spirits for wood preservatives and the finished products for wood

preservatives.

TERM:

3 years

STORAGE TANKS:

Mineral Spirits 38009
Woodtox Concentrate T-1-7 20001
Woodtox Preprime RTU 13001

Koppers - 3 - 8,000 1 - 6,000 1 - 3,000

FACILITY FEE:

\$700/month

ADDITIONAL CHARGES:

\$0.0500 per gallon for each gallon Woodtox Concentrate T-1-7 received in railcar. This includes adding the wax and mineral spirits to make Woodtox Preprime RTU.

\$0.0036 per gallon - bulk T/T loading of Woodtox

Preprime RTU.

\$0.0730 per gallon - drum filling of Woodtox Preprime

RTU.

\$0.7500 per drum in and \$0.7500 per drum out for prepackaged finish goods products produced by Koppers.

SPECIAL PROVISIONS:

Operator shall blend or mix the above referenced products at temperatures not to exceed 180°F.

Mineral Spirits - for resale - \$0.0300 per gallon - total thru put charge.

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## FINAL DRAFT

# STORAGE AND CONCENTRATE DILUTION AGREEMENT

THIS AGREEMENT, made and entered into this day of
19 , by and between TIME OIL CO. (hereinafter referred to as "Operator"), a corporation incorporated and existing under the laws of the State of Washington and KOPPERS COMPANY, INC. (hereinafter referred to as "Customer"), a corporation organized and existing under the laws of the State of Delaware.
WHEREAS, Operator is the owner of certain terminal facilities and whereas, Customer desires to obtain permission to place its hereinafter described products therein; the parties hereto agree as follows:
1. FACILITIES AND TERM: Operator does hereby agree to provide and Customer does hereby agree to accept certain terminal facilities and handling services, at 12005 North Burgard, Portland, Oregon as set forth in the schedule attached, and as hereinafter provided. This agreement shall be for a term of 3 years, beginning on the of, 19, and continuing through the day of, 19
Operator reserves the right at any time or times during the term of this Agreement to substitute other suitable premises and facilities in lieu of those designated herein for the storage and handling of Customer's products upon Customer's mutual consent. Customer further warrants and represents that Customer shall be the sole owner of all products at any time delivered by Customer to the tanks, warehouse or other facilities herein provided for, and that all such products shall be free from all liens and encumbrances of any nature whatsoever until such products are delivered by Operator back to Customer from Operator's facilities hereunder.
2. PRODUCTS STORED: Customer shall use the facilities furnished hereunder for the storage and handling of only the products specified in the schedule attached hereto. Other products can be added to the attached schedule during the duration of this contract by mutual consent of the Operator and Customer.

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SERVICES PROVIDED: Subject to the terms and conditions herein, Operator

agrees to provide all labor and equipment necessary to receive the products specified in the attached schedule for storage and to remove them from storage for delivery as Customer may require. Provided that Operator shall not be obligated to provide equipment for receipt or delivery of products which is

not already in place at the above described facility.

All services hereunder shall be provided as follows:

- (a) Shipments to and from tank car and transport truck shall be performed during normal working hours; which shall be 8:00 a.m. to 4:30 p.m., Monday through Friday, holiday excepted. Tank cars and transport trucks shall be handled on a first arrival-first serve basis.
- (b) There shall be no intra-terminal tank transfers (unless done for convenience of Operator pursuant to paragraph 1) and/or blending services performed by Operator other than that specifically provided for in the attached schedule unless mutually agreed to before and by the Operator and Customer.

Except as noted herein or in the attached schedule the services described shall be included in the facility fee set forth in the attached schedule, which fee shall be paid monthly in advance commencing on the first day of the term hereof unless otherwise provided in the schedule attached.

Only if the Customer requests services and the Operator is able to provide same at other than the hours provided above, Customer agrees to pay to Operator, in addition to the facility fee; 1) a labor charge, which shall be \$18.63 per hour for normal working hours and \$26.16 per hour for overtime hours for each such man hour worked by employees of Operator, and 2) an overhead charge calculated at 10% of the labor charge. In the event that Operator's actual labor costs, increase during the term of this contract, Operator shall have the right to adjust the above labor charge to cover those costs upon notice to Customer. The term "actual labor costs" as used in this paragraph shall include wages, overtime, contributions to Social Security, Unemployment and Workmen's Compensation, and employee benefits.

The minimum facility fee and all other charges set forth in the attached schedule shall be adjusted annually on the anniversary date of the effective date of this agreement by multiplying the then current monthly facility fee and all other charges set forth in the attached schedule by a fraction of which the numerator is the U. S. Department of Labor's National Consumer Price Index for the month preceding the anniversary month and the denominator of which is the same index for the same month in the preceding year.

Operator shall perform the calculation necessary and determine any such increased fees and charges and shall notify Customer thereof. Until receipt of such notification from Operator and agreement by the Customer, Customer shall continue to pay the previously reflected monthly fees and charges. In the event that the U. S. Department of Labor's National Consumer Price Index shall have declined for any given period, the minimum facility fee and all other charges set forth in the attached schedule shall be adjusted accordingly as noted above.

If for any reason, the U. S. Department of Labor shall discontinue publication of the National Consumer Price Index during the term of this Agreement, the Operator shall give 30 days written notice to the Customer, of the use of an alternate index of changes in the general economy which would be applicable. If the Customer delivers to Operator a notice of rejection of the Operator's choice of an alternate index of changes in the general economy within 30 days from receipt by Customer of Operator's written notice thereof, both parties herein shall be bound by an index to be applied to the formula herein as determined by an independent commercial appraiser selected by both parties, with the costs of such determination to be borne equally by both parties.

Customer asserts no claim for the use of Operator's facilities except as expressly provided in this Agreement. Customer will use the tank car and transport truck facilities as hereinabove provided only for loading or unloading product into Operator's facilities and will not utilize said tank car or transport truck space before or beyond the period reasonably required for actual loading or unloading. All other areas are closed to Customer except when accompanied by a representative of Operator and upon Customer's execution of a Hold Harmless Agreement acceptable to Operator.

While on Operator's terminal premises, Customer will comply at all times with any and all rules established by Operator and with all governmental statues, ordinances, rules, regulations orders or requirements concerning air quality, water quality, or waste standards or controls imposed on or relating to the operation and use of the terminal facilities.

Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.

4. ACCOUNTING FOR PRODUCT: The quantity of product received into or withdrawn from storage tanks shall be determined by Operator's representatives, or at Operator's election, a licensed inspector, by checking and gauging said tanks at the time of receipt or withdrawal of said product, but not more often than once per day. Customer may participate, but in the absence of such participation, gauges taken by Operator shall be presumed to be correct, unless such gauges can be proved to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually agreed upon calibration charts of the rail car or truck tanks. In the event of any disagreement as to quantities of material received or withdrawn, the issue shall, upon written notice of either party to the other be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, with the hearing to be held in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date of the conclusion of the proceedings, and shall be final and binding upon the

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parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto.

If requested by Customer, Operator will take samples from rail tank cars, automotive tank trucks and storage tanks and make such samples available to Customer at Operator's facilities hereunder. The cost of containers for such samples and all other expenses suffered by Operator in connection with the taking and delivery of samples, shall be paid to Operator by customer each month upon receipt of invoice from Operator. Samples shall be taken in accordance with reasonable procedures specified by Customer.

All quantities of product delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees fahrenheit (60°) in accordance with recognized temperature correction tables. The term "barrel" whenever used herein, means 42 U. S. gallons at sixty degrees fahrenheit.

TERMINATION DUE TO GOVERNMENT REGULATION: Should the County or City, in which Operator's facilities are located, or any other Governmental entity, local or federal, prohibit operation of any then existing facilities used in performing this Agreement, or in any way deprive Operator of the right to use the modification of such facilities or the construction of additional facilities to be used in performing this Agreement, this Agreement shall terminate at the option of Operator, unless Customer shall agree in writing within according a starter receipt of Operator's written election to terminate this Agreement to pay for the cost of replacing any such facilities or property of which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such Governmental entity, on terms acceptable to Operator.

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6. PAYMENT AND INTEREST FEE: Customer agrees that fees and charges not paid within 30 days after presentation of Operator's invoice shall be subject to 5/6 of 1% interest charge on the outstanding invoice balance. This monthly 5/6 of 1% charge is an interest fee and is not a remedy of an item of liquidated damages. All payments hereunder shall be made to Operator at its office at P. O. Box 24447, Terminal Annex, Seattle, Washington 98124 or at such other place or places as Operator may notify Customer in writing.

7. TERMINATION: Costomer may terminate this Agreement six (6) months after formal written notice is provided to the operator. Customer agrees upon expiration or termination of this Agreement to remove all of its material within a rescent period of time, either bulk or packaged, from Operator's premises.

Customer shall be responsible for any and all costs incurred by Operator at the expiration of the term hereof in removal and disperal of majorial and cleaning said storage tank/tanks and the related facilities. Sustomer shall pay Operator immediately after presentation to customer of invoice for all such cleaning costs. Cost for cleaning said tank/tanks and related facilities shall include, but not be limited to costs related to supplies, permits, use

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of equipment, labor and supervision. Tank rentals hereunder shall continue until such cleaning and disposal is accomplished. Prior to any actual costs being incurred the Operator will provide a written estimate of costs to the Customer for approval prior to beginning the actual clean up work.

LOSSES: Operator shall not be liable for normal losses due to spillage. what evaporation during normal handling of products. Operator shall not be liable for any delay or nonperformance hereunder or for evaporation, shrinkage, line loss, clingage, discoloration, contamination, bacterial action destruction of the harbor or any of the facilities referred to herein when any of the foregoing is caused in whole or in part, by any act of God or public enemy, or by labor troubles, strikes, lockouts, nonavailability of labor, riots, fires, war, storms, explosions, breakdowns or machinery, railroad embargoes or interventions, failure or delay of manufacturers or of persons from whom Operator is obtaining machinery, equipment, materials or supplies to deliver the same, or other causes beyond its control, whether such other causes be the causes herein specifically provided for or not, and whether the cause is or is not existing on the date of this Agreement. Operator shall not, in any event, be liable for loss of or damage to Customer's property, except and only when caused by Operator's failure to use reasonable care in the safekeeping and handling of Customer's property and further provide that claim is made in writing within 30 days after receipt of actual or constructive notice of any such loss or damages. It is mutually understood that the Operator is not responsible for any changes in the quality of the product stored which might occur in storage due to the possible effect of air, light, temperature or other natural or chemical happenings.

Losses of any product for which Operator is responsible hereunder shall be determined annually at the end of each year, commencing with the date of the first receipt of such product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals during the period for which the accounting is made, plus the stock on hand at the end of such period, from the sum of the total receipts during such period plus the stock on hapd at the beginning of such period. Normal losses shall be presumed to be (3/4 of 1%) per month of receipts plus maximum amounts in storage during the period for which accounting is made and such amounts shall be deducted from any claims for losses.

Customer at his own expense.

INSURANCE Insurance, If any be desired by Customer, shall be carried by on spirit mer at his dun expense.

DEFAULT: Should Customer default at any time in the name. FO. DEFAULT: Should Customer default at any time in the prompt payment of any of the monies due hereunder, or in the prompt performance and observance of any of the terms, or conditions of this Agreement, and should any such default, not relating to the payment of money, continue for thirty (30) days or more after written notice thereof by Operator to Customer, or should Customer go into bankruptcy voluntary or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly fee for the whole unexpired term hereof together with all

other accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event / Operator shall also have the right, at its option, to terminate this Agreement six (6) months after written notice to the Customet

The failure by Operator at any time to enforce any default or right reserved to it, or to require performance of any of the terms, dovenants, or provisions hereof by Customer at any time designated, shall not be a waiver of any such default or right to which operator is entitled, nor shall it in any way affect the right of Operator to enforce such provisions thereafter.

11. DAMAGES: In consideration of the rates for monthly fees and other charges set forth herein (it being recognized that higher charges would be made for the limitation of liability set forth in this paragraph) it is understood and agreed that Operator shall in no event be liable for more than actual cash value, for any product loss or damage. Operator shall not be liable for special or consequential damages, no matter how such loss or damage shall have occurred or been caused. Customer not light for operational lassondomage to facility during the term

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12. ASSIGNMENT: This Agreement shall be binding upon and inure to the benefit of the successors and assigns of each of the parties hereto, provided, however, that Customer shall not transfer or assign this Agreement, in whall or part, without the prior written consent of Operator, which will not be unreasonably withheld and any such transfer or assignment made in violation of this paragraph shall be mull and void and of no force or effect whatsoever.

13. AGREEMENT: This Agreement is complete and contains all warranties and representations which form the basis of this Agreement. There exist no other representations or warranties unless they are enumerated herein. No amendment or modification of this Agreement shall be effective or binding unless such modification is in a written form signed by both parties hereto.

Each numbered paragraph or clause herein to this Agreement stands on its own and if any numbered paragraph or clause is held to be invalid or unenforceable, such clause shall be held separated and severable from this Agreement and the remaining Agreement shall remain in full force and effect.

If a conflict arises between the specific meaning or application of a term, clause or paragraph of the Agreement language and the accompanying schedules; the language and specific meaning of the accompanying schedules shall control and be followed.

14. NOTICES: All notices from one party to the other shall be directed to the appropriate address below or such other address or addresses as either party shall notify the other in writing:

OPERATOR: Time Oil Co.

P. O. Box 24447, Terminal Annex, Seattle, WA 98124

CUSTOMER: Koppers Company, Inc.
5317 Southwest Avenue, St. Louis, Mo 63110

IN WITNESS WHEREOF, this Agreement has been made and executed by the parties hereto as of the day, month and year first hereinabove written.

Attest:	OPERATOR: TIME OIL CO.
Secretary	By:its
	CUSTOMER: KOPPERS COMPANY, INC.
	By:
Secretary	its

#### SCHEDULE TO STORAGE AND CONCENTRATE DILUTION AGREEMENT

DATE

TERMINAL:

12005 North Burgard, Portland, Oregon

CUSTOMER:

Koppers Company, Inc.

COMMODITIES

TO BE STORED:

Woodtox Concentrate, wax, mineral spirits for wood preservatives and the finished products for wood

preservatives.

TERM:

3 years

STORAGE TANKS:

Mineral Spirits 38009
Woodtox Concentrate T-1-7 20001
Woodtox Preprime RTU 13001

MIX TANK

Koppers - 3 - 8,000 1 - 6,000

1 - 3,000

FACILITY FEE:

\$700/month

ADDITIONAL CHARGES:

\$0.0500 per gallon for each gallon Woodtox Concentrate T-1-7 received in railcar. This includes adding the wax and mineral spirits to make Woodtox Preprime RTU. All blending is to be in accordance with Koppers specifications, which have been provided to the Operator.

\$0.0036 per gallon - bulk T/T loading of Woodtox Preprime RTU.

\$0.0730 per gallon - drum filling of Woodtox Preprime RTU.

\$0.7500 per drum in and \$0.7500 per drum out for prepackaged finish goods products produced by Koppers.

SPECIAL PROVISIONS:

Operator shall blend or mix the above referenced products at temperatures not to exceed 180°F.

Mineral Spirits - \$0.0300 per gallon - total thru put charge. Covers unloading and reloading for shipment.

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From the desk of

DONALD F. MARION

TO: JOHN PALMER KEN COGAD BILL BALDWIN Ton McGuire

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into agreement.

#### FINAL DRAFT

#### STORAGE AND CONCENTRATE DILUTION AGREEMENT

THIS AGREEMENT, made and entered into this day of 19, by and between TIME OIL CO. (hereinafter referred to as "Operator"), a corporation incorporated and existing under the laws of the State of Washington and KOPPERS COMPANY, INC. (hereinafter referred to as "Customer"), a corporation organized and existing under the laws of the State of Delaware.
WHEREAS, Operator is the owner of certain terminal facilities and whereas, Customer desires to obtain permission to place its hereinafter described products therein; the parties hereto agree as follows:
1. FACILITIES AND TERM: Operator does hereby agree to provide and Customer does hereby agree to accept certain terminal facilities and handling services, at 12005 North Burgard, Portland, Oregon as set forth in the schedule attached, and as hereinafter provided. This agreement shall be for a term of 3 years, beginning on the of, 19, and continuing through the day of, 19
Operator reserves the right at any time or times during the term of this

Operator reserves the right at any time or times during the term of this Agreement to substitute other suitable premises and facilities in lieu of those designated herein for the storage and handling of Customer's products upon Customer's mutual consent. Customer further warrants and represents that Customer shall be the sole owner of all products at any time delivered by Customer to the tanks, warehouse or other facilities herein provided for, and that all such products shall be free from all liens and encumbrances of any nature whatsoever until such products are delivered by Operator back to Customer from Operator's facilities hereunder.

- 2. PRODUCTS STORED: Customer shall use the facilities furnished hereunder for the storage and handling of only the products specified in the schedule attached hereto. Other products can be added to the attached schedule during the duration of this contract by mutual consent of the Operator and Customer.
- 3. <u>SERVICES PROVIDED</u>: Subject to the terms and conditions herein, Operator agrees to provide all labor and equipment necessary to receive the products specified in the attached schedule for storage and to remove them from storage for delivery as Customer may require. Provided that Operator shall not be obligated to provide equipment for receipt or delivery of products which is not already in place at the above described facility.

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All services hereunder shall be provided as follows:

- (a) Shipments to and from tank car and transport truck shall be performed during normal working hours; which shall be 8:00 a.m. to 4:30 p.m., Monday through Friday, holiday excepted. Tank cars and transport trucks shall be handled on a first arrival-first serve basis.
- (b) There shall be no intra-terminal tank transfers (unless done for convenience of Operator pursuant to paragraph 1) and/or blending services performed by Operator other than that specifically provided for in the attached schedule unless mutually agreed to before and by the Operator and Customer.

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Except as noted herein or in the attached schedule the services described shall be included in the facility fee set forth in the attached schedule, which fee shall be paid monthly in advance commencing on the first day of the term hereof unless otherwise provided in the schedule attached.

Only if the Customer requests services and the Operator is able to provide same at other than the hours provided above, Customer agrees to pay to Operator, in addition to the facility fee; 1) a labor charge, which shall be \$18.63 per hour for normal working hours and \$26.16 per hour for overtime hours for each such man hour worked by employees of Operator, and 2) an overhead charge calculated at 10% of the labor charge. In the event that Operator's actual labor costs, increase during the term of this contract, Operator shall have the right to adjust the above labor charge to cover those costs upon notice to Customer. The term "actual labor costs" as used in this paragraph shall include wages, overtime, contributions to Social Security, Unemployment and Workmen's Compensation, and employee benefits.

The minimum facility fee and all other charges set forth in the attached schedule shall be adjusted annually on the anniversary date of the effective date of this Agreement by multiplying the then current monthly facility fee and all other charges set forth in the attached schedule by a fraction of which the numerator is the U. S. Department of Labor's National Consumer Price Index for the month preceding the anniversary month and the denominator of which is the same index for the same month in the preceding year.

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Operator shall perform the calculation necessary and determine any such increased fees and charges and shall notify Customer thereof. Until receipt of such notification from Operator and agreement by the Customer, Customer shall continue to pay the previously reflected monthly fees and charges. In the event that the U. S. Department of Labor's National Consumer Price Index shall have declined for any given period, the minimum facility fee and all other charges set forth in the attached schedule shall be adjusted accordingly as noted above.

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If for any reason, the U. S. Department of Labor shall discontinue publication of the National Consumer Price Index during the term of this Agreement, the Operator shall give 30 days written notice to the Customer, of the use of an alternate index of changes in the general economy which would be applicable. If the Customer delivers to Operator a notice of rejection of the Operator's choice of an alternate index of changes in the general economy within 30 days from receipt by Customer of Operator's written notice thereof, both parties herein shall be bound by an index to be applied to the formula herein as determined by an independent commercial appraiser selected by both parties, with the costs of such determination to be borne equally by both parties.

Customer asserts no claim for the use of Operator's facilities except as expressly provided in this Agreement. Customer will use the tank car and transport truck facilities as hereinabove provided only for loading or unloading product into Operator's facilities and will not utilize said tank car or transport truck space before or beyond the period reasonably required for actual loading or unloading. All other areas are closed to Customer except when accompanied by a representative of Operator and upon Customer's execution of a Hold Harmless Agreement acceptable to Operator.

While on Operator's terminal premises, Customer will comply at all times with any and all rules established by Operator and with all governmental statues, ordinances, rules, regulations, orders or requirements concerning air quality, water quality, or waste standards or controls imposed on or relating to the operation and use of the terminal facilities.

Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.

4. ACCOUNTING FOR PRODUCT: The quantity of product received into or withdrawn from storage tanks shall be determined by Operator's representatives, or at Operator's election, a licensed inspector, by checking and gauging said tanks at the time of receipt or withdrawal of said product, but not more often than once per day. Customer may participate, but in the absence of such participation, gauges taken by Operator shall be presumed to be correct, unless such gauges can be proved to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually agreed upon calibration charts of the rail car or truck tanks. In the event of any disagreement as to quantities of material received or withdrawn, the issue shall, upon written notice of either party to the other be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, with the hearing to be held in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date of the conclusion of the proceedings, and shall be final and binding upon the

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parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto.

If requested by Customer, Operator will take samples from rail tank cars, automotive tank trucks and storage tanks and make such samples available to Customer at Operator's facilities hereunder. The cost of containers for such samples and all other expenses suffered by Operator in connection with the taking and delivery of samples, shall be paid to Operator by customer each month upon receipt of invoice from Operator. Samples shall be taken in accordance with reasonable procedures specified by Customer.

All quantities of product delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees fahrenheit  $(60^{\circ})$  in accordance with recognized temperature correction tables. The term "barrel" whenever used herein, means 42 U. S. gallons at sixty degrees fahrenheit.

TERMINATION DUE TO GOVERNMENT REGULATION: Should the County or city, in which Operator's facilities are located, or any other Governmental entity, local or federal, prohibit operation of any then existing facilities used in performing this Agreement, or in any way deprive Operator of the right to use the modification of such facilities or the construction of additional facilities to be used in performing this Agreement, this Agreement shall terminate at the option of Operator, unless Customer shall agree in writing within \$\sum\_{\text{30}}\$ days after receipt of Operator's written election to terminate this Agreement to pay for the cost of replacing any such facilities or property of which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such Governmental entity, on terms acceptable to Operator.

PAYMENT AND INTEREST FEE: Customer agrees that fees and charges not paid within 22 days after presentation of Operator's invoice shall be subject to 5/6 of 1% interest charge on the outstanding invoice balance. This monthly 5/6 of 1% charge is an interest fee and is not a remedy of an item of liquidated damages. All payments hereunder shall be made to Operator at its office at P. O. Box 24447, Terminal Annex, Seattle, Washington 98124 or at such other place or places as Operator may notify Customer in writing.

TERMINATION: Customer may terminate this Agreement six (6) months after formal written notice is provided to the Operator. Customer agrees upon expiration or termination of this Agreement to remove all of its material within a reasonable period of time, either bulk or packaged, from Operator's premises.

Customer shall be responsible for any and all costs incurred by Operator at the expiration of the term hereof in removal and disposal of material and cleaning said storage tank/tanks and the related facilities. Customer shall pay Operator immediately after presentation to Customer of invoice for all such cleaning costs. Cost for cleaning said tank/tanks and related facilities shall include, but not be limited to costs related to supplies, permits, use

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of equipment, labor and supervision. Tank rentals berounder shall continue until such cleaning and disposal is accomplished. Prior to any actual costs being incurred the Operator will provide a written estimate of costs to the Customer for approval prior to beginning the actual clean up work.

7. 🔏 LOSSES: Operator shall not be liable for normal losses due to spillage mand evaporation during normal handling of products. Operator shall not be liable for any delay or nonperformance hereunder or for evaporation, shrinkage, line loss, clingage, discoloration, contamination, bacterial action, destruction of the harbor or any of the facilities referred to herein when any of the foregoing is caused in whole or in part, by any act of God or public enemy, or by labor troubles, strikes, lockouts, nonavailability of labor, riots, fires, war, storms, explosions, breakdowns or machinery, railroad embargoes or interventions, failure or delay of manufacturers or of persons from whom Operator is obtaining machinery, equipment, materials or supplies to deliver the same, or other causes beyond its control, whether such other causes be the causes herein specifically provided for or not, and whether the cause is or is not existing on the date of this Agreement. Operator shall not, in any event, be liable for loss of or damage to Customer's property, except and only when caused by Operator's failure to use reasonable care in the safekeeping and handling of Customer's property and further provide that claim is made in writing within 30 days after receipt of actual or constructive notice of any such loss or damages. It is mutually understood that the Operator is not responsible for any changes in the quality of the product stored which might occur in storage due to the possible effect of air, light, temperature or other natural or chemical happenings.

Losses of any product for which Operator is responsible hereunder shall be determined annually at the end of each year, commencing with the date of the first receipt of such product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals during the period for which the accounting is made, plus the stock on hand at the end of such period, from the sum of the total receipts during such period plus the stock on hand at the beginning of such period. Normal losses shall be presumed to be of 1% per month of receipts plus maximum amounts in storage during the period for which accounting is made and such amounts shall be deducted from any claims for losses.

9. INSURANCE Insurance, of any be desired by Customer, shall be carried by Customer at his own expense.

BEFAULT: Should Customer default at any time in the prompt payment of any of the monies due hereunder, or in the prompt performance and observance of any of the terms, or conditions of this Agreement, and should any such default, not relating to the payment of money, continue for thirty (30) days or more after written notice thereof by Operator to Customer, or should Customer go into bankruptcy voluntary or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly fee for the whole unexpired term hereof together with all

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other accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement six (6) months after written notice to the Customer.

The failure by Operator at any time to enforce any default or right reserved to it, or to require performance of any of the terms, covenants, or provisions hereof by Customer at any time designated, shall not be a waiver of any such default or right to which operator is entitled, nor shall it in any way affect the right of Operator to enforce such provisions thereafter.

- DAMAGES: In consideration of the rates for monthly fees and other charges set forth herein (it being recognized that higher charges would be made for the limitation of liability set forth in this paragraph) it is understood and agreed that Operator shall in no event be liable for more than actual cash value, for any product loss or damage. Operator shall not be liable for special or consequential damages, no matter how such loss or damage shall have occurred or been caused.
- NO. 32. ASSIGNMENT: This Agreement shall be binding upon and inure to the benefit of the successors and assigns of each of the parties hereto; provided, however, that Customer shall not transfer or assign this Agreement, in whole or part, without the prior written consent of Operator, which will not be unreasonably withheld and any such transfer or assignment made in violation of this paragraph shall be null and void and of no force or effect whatsoever.

AGREEMENT: This Agreement, is complete and contains all warranties and representations which form the basis of this Agreement. There exist no other representations or warranties unless they are enumerated herein. No amendment or modification of this Agreement shall be effective or binding unless such modification is in a written form signed by both parties hereto.

Each numbered paragraph or clause herein to this Agreement stands on its own and if any numbered paragraph or clause is held to be invalid or unenforceable, such clause shall be held separated and severable from this Agreement and the remaining Agreement shall remain in full force and effect.

If a conflict arises between the specific meaning or application of a term, clause or paragraph of the Agreement language and the accompanying schedules; the language and specific meaning of the accompanying schedules and shall control and be followed.

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12. THE NOTICES: All notices from one party to the other shall be directed to the appropriate address below or such other address or addresses as either party shall notify the other in writing:

OPERATOR: Time Oil Co.

P. O. Box 24447, Terminal Annex, Seattle, WA 98124

CUSTOMER: Koppers Company, Inc.

5317 Southwest Avenue, St. Louis, Mo 63110

IN WITNESS WHEREOF, this Agreement has been made and executed by the parties hereto as of the day, month and year first hereinabove written.

Attest:	OPERATOR: TIME OIL CO.			
Secretary	By: its			
	CUSTOMER: KOPPERS COMPANY, INC			
	Ву:			
Secretary	its			

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#### SCHEDULE TO STORAGE AND CONCENTRATE DILUTION AGREEMENT

DATE

TERMINAL:

12005 North Burgard, Portland, Oregon

CUSTOMER:

Koppers Company, Inc.

COMMODITIES

TO BE STORED:

Woodtox Concentrate, wax, mineral spirits for wood preservatives and the finished products for wood  $% \left\{ 1\right\} =\left\{ 1\right\}$ 

preservatives.

TERM:

3 years

STORAGE TANKS:

 $\begin{array}{lll} \mbox{Mineral Spirits} & 38009 \\ \mbox{Woodtox Concentrate T-1-7} & 20001 \\ \mbox{Woodtox Preprime RTU} & 13001 \\ \end{array}$ 

MIX TANK

Koppers - 3 - 8,000 1 - 6,000 1 - 3,000

\$500

FACILITY FEE:

\$700/month

ADDITIONAL CHARGES:

\$0.0500 per gallon for each gallon Woodtox Concentrate T-1-7 received in railcar. This includes adding the wax and mineral spirits to make Woodtox Preprime RTU. All blending is to be in accordance with Koppers specifications, which have been provided to the Operator.

0.0036 per gallon - bulk T/T loading of Woodtox Preprime RTU.

\$0.0730 per gallon - drum filling of Woodtox Preprime RTU.

\$0.7500 per drum in and \$0.7500 per drum out for prepackaged finish goods products produced by Koppers.

SPECIAL PROVISIONS:

Operator shall blend or mix the above referenced products at temperatures not to exceed 180°F.

Mineral Spirits - \$0.0300 per gallon - total thru put charge. Covers unloading and reloading for shipment.

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From the desk of

#### SCHEDULE TO STORAGE AND CONCENTRATE DILUTION AGREEMENT

TERMINAL:

12005 North Burgard, Portland, Oregon

CUSTOMER:

Koppers Company, Inc.

COMMODITIES

TO BE STORED:

Woodtox Concentrate, wax, mineral spirits for wood preservatives and the finished products for wood

preservatives.

TERM:

3 years

STORAGE TANKS:

Mineral Spirits 38009
Woodtox Concentrate T-1-7 20001
Woodtox Preprime RTU 13001

Mix Tank

Koppers - 3 - 8,000 1 - 6,000 1 - 3,000

FACILITY FEE:

\$500/month

ADDITIONAL CHARGES:

\$0.0500 per gallon for each gallon Woodtox Concentrate T-1-7 received in railcar. This includes adding the wax and mineral spirits to make Woodtox Preprime RTU. All blending is to be in accordance with Koppers specifications, which have been provided to the Operator.

\$0.0036 per gallon - bulk T/T loading of Woodtox Preprime RTU.

\$0.0730 per gallon - drum filling of Woodtox Preprime RTU.

\$0.7500 per drum in and \$0.7500 per drum out for prepackaged finish goods products produced by Koppers.

SPECIAL PROVISIONS:

Operator shall blend or mix the above referenced products at temperatures not to exceed 180°F.

Mineral Spirits - \$0.0300 per gallon - total thru put charge. Covers unloading and reloading for shipment.

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Koppers Company, Inc., Forest Products Group Pittsburgh, PA 15219, Telephone 412-227-2775

Donald F. Marion Manager, Raw Materials Specially Wood Chemicals Division

May 20, 1983

Time Oil Company P. O. Box 24447 Terminal Annex

Seattle, Washington

Attention: Mr. Robert D Abendrot Operations Manager

ear Robert:

Attached for your review and execution are two (2) copies of the Storage and Concentrate Dilution Agreement between Time Oil Company and Koppers Company, Inc. Please review the Agreement and execute both copies on behalf of Time Oil Company and return them to me for execution by Koppers Company, Inc. I have also forwarded a copy of the Agreement to Neil Wallis in Portland for his review. Should you desire to get together either in Seattle or Portland to review the Agreement and thus finalize all the language, please advise. I have left my schedule open to accommodate your schedule. As soon as the Agreement is executed, I will arrange to have the first 10,000 gallon railcar shipped to Portland for dilution. At that time, someone from the St. Louis operation will be in Portland to review the mixing procedure with Neil Gallagher to insure that everything goes smoothly. At that time, we will also coordinate with Neil Wallis and Neil Gallagher to reduce and ultimately eliminate raw materials and finished goods that will no longer be needed in Portland. I anticipate a very smooth transition during this period.

I will anxiously be awaiting your call regarding the next steps in finalizing the Agreement and getting everything in motion. I sincerely appreciate all your and Neil Wallis' cooperation in finalizing this matter.

Sincerely yours,

Donald F. Marion

DFM/cti

Attachments

cc: J. Palmer

P. A. Goydan

T. McGuire

N. Wallis - Time Oil Company

#### STORAGE AND CONCENTRATE DILUTION AGREEMENT

19 , by and between TIME OIL CO. (hereinafter referred to as

THIS AGREEMENT, made and entered into this day of

"Operator"), a corporation incorporated and existing under the laws of the
State of Washington and KOPPERS COMPANY, INC. (hereinafter referred to as
"Customer"), a corporation organized and existing under the laws of the State
of Delaware.
WHEREAS, Operator is the owner of certain terminal facilities and where-
as, Customer desires to obtain permission to place its hereinafter described
products therein; the parties hereto agree as follows:
products therein, the parties herete agree as relieved.
1. FACILITIES AND TERM: Operator does hereby agree to provide and Customer
does hereby agree to accept certain terminal facilities and handling services,
at 12005 North Burgard, Portland, Oregon as set forth in the schedule at-
tached, and as hereinafter provided. This agreement shall be for a term of 3
years, beginning on the of , 19 , and continuing through the
day of, 19

Operator reserves the right at any time or times during the term of this Agreement to substitute other suitable premises and facilities in lieu of those designated herein for the storage and handling of Customer's products upon Customer's mutual consent. Customer further warrants and represents that Customer shall be the sole owner of all products at any time delivered by Customer to the tanks, warehouse or other facilities herein provided for, and that all such products shall be free from all liens and encumbrances of any nature whatsoever until such products are delivered by Operator back to Customer from Operator's facilities hereunder.

- 2. PRODUCTS STORED: Customer shall use the facilities furnished hereunder for the storage and handling of only the products specified in the schedule attached hereto. Other products can be added to the attached schedule during the duration of this Agreement by mutual consent of the Operator and Customer.
- 3. <u>SERVICES PROVIDED</u>: Subject to the terms and conditions herein, Operator agrees to provide all labor and equipment necessary to receive the products specified in the attached schedule for storage and to remove them from storage for delivery as Customer may require. Provided that Operator shall not be obligated to provide equipment for receipt or delivery of products which is not already in place at the above described facility.

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All services hereunder shall be provided as follows:

- (a) Shipments to and from tank car and transport truck shall be performed during normal working hours; which shall be 8:00 a.m. to 4:30 p.m., Monday through Friday, holiday excepted. Tank cars and transport trucks shall be handled on a first arrival-first serve basis.
- (b) There shall be no intra-terminal tank transfers (unless done for convenience of Operator pursuant to paragraph 1) and/or blending services performed by Operator other than that specifically provided for in the attached schedule unless mutually agreed to beforehand by the Operator and Customer.

Except as noted herein or in the attached schedule the services described shall be included in the facility fee set forth in the attached schedule, which fee shall be paid monthly in advance commencing on the first day of the term hereof unless otherwise provided in the schedule attached.

Only if the Customer requests services and the Operator is able to provide same at other than the hours provided above, Customer agrees to pay to Operator, in addition to the facility fee; 1) a labor charge, which shall be \$18.63 per hour for normal working hours and \$26.16 per hour for overtime hours for each such man hour worked by employees of Operator, and 2) an overhead charge calculated at 10% of the labor charge. In the event that Operator's actual labor costs, increase during the term of this contract, Operator shall have the right to adjust the above labor charge to cover those costs upon notice to Customer. The term "actual labor costs" as used in this paragraph shall include wages, overtime, contributions to Social Security, Unemployment and Workmen's Compensation, and employee benefits.

The minimum facility fee and all other charges set forth in the attached schedule shall be adjusted annually on the anniversary date of the effective date of this Agreement by multiplying the then current monthly facility fee and all other charges set forth in the attached schedule by a fraction of which the numerator is the U. S. Department of Labor's National Consumer Price Index for the month preceding the anniversary month and the denominator of which is the same index for the same month in the preceding year.

Operator shall perform the calculation necessary and determine any such increased fees and charges and shall notify Customer thereof. Until receipt of such notification from Operator and agreement by the Customer, Customer shall continue to pay the previously reflected monthly fees and charges. In the event that the U. S. Department of Labor's National Consumer Price Index

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- 2 -

shall have declined for any given period, the minimum facility fee and all other charges set forth in the attached schedule shall be adjusted accordingly as noted above.

If for any reason, the U. S. Department of Labor shall discontinue publication of the National Consumer Price Index during the term of this Agreement, the Operator shall give 30 days written notice to the Customer, of the use of an alternate index of changes in the general economy which would be applicable. If the Customer delivers to Operator a notice of rejection of the Operator's choice of an alternate index of changes in the general economy within 30 days from receipt by Customer of Operator's written notice thereof, both parties herein shall be bound by an index to be applied to the formula herein as determined by an independent commercial appraiser selected by both parties, with the costs of such determination to be borne equally by both parties.

Customer asserts no claim for the use of Operator's facilities except as expressly provided in this Agreement. Customer will use the tank car and transport truck facilities as hereinabove provided only for loading or unloading product into Operator's facilities and will not utilize said tank car or transport truck space before or beyond the period reasonably required for actual loading or unloading. All other areas are closed to Customer except when accompanied by a representative of Operator and upon Customer's execution of a Hold Harmless Agreement acceptable to Operator.

Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.

ACCOUNTING FOR PRODUCT: The quantity of product received into or withdrawn from storage tanks shall be determined by Operator's representatives, or at Operator's election, a licensed inspector, by checking and gauging said tanks at the time of receipt or withdrawal of said product, but not more often than once per day. Customer may participate, but in the absence of such (participation, gauges taken by Operator shall be presumed to be correct. unless such gauges can be proved to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually agreed upon calibration charts of the rail car or truck tanks. In the event of any disagreement as to quantities of material received or withdrawn, the issue shall, upon written notice of either party to the other be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, with the hearing to be held in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date of the conclusion of the proceedings, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto.

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If requested by Customer, Operator will take samples from rail tank cars, automotive tank trucks and storage tanks and make such samples available to Customer at Operator's facilities hereunder. The cost of containers for such samples and all other expenses suffered by Operator in connection with the taking and delivery of samples, shall be paid to Operator by customer each month upon receipt of invoice from Operator. Samples shall be taken in accordance with reasonable procedures specified by Customer.

All quantities of product delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees fahrenheit (60°) in accordance with recognized temperature correction tables. The term "barrel" whenever used herein, means 42 U. S. gallons at sixty degrees fahrenheit.

- PAYMENT AND INTEREST FEE: Customer agrees that fees and charges not paid within 45 days after presentation of Operator's invoice shall be subject to 5/6 of 1% interest charge on the outstanding invoice balance. This monthly 5/6 of 1% charge is an interest fee and is not a remedy of an item of liquidated damages. All payments hereunder shall be made to Operator at its office at P. O. Box 24447, Terminal Annex, Seattle, Washington 98124 or at such other place or places as Operator may notify Customer in writing.
- TERMINATION: Either Party may terminate this Agreement twelve (12) months after formal written notice is provided to the other Party. Customer agrees upon expiration or termination of this Agreement to remove all of its material and equipment within a 90 day period of time, either bulk or packaged, from Operator's premises.

LOSSES: Operator shall not be liable for normal losses due to evaporation during normal handling of products. Operator shall not be liable for any delay or nonperformance hereunder or for evaporation, shrinkage, line loss, clingage, discoloration, contamination, bacterial action, destruction of the harbor or any of the facilities referred to herein when any of the foregoing is caused in whole or in part, by any act of God or public enemy, or by labor troubles, strikes, lockouts, nonavailability of labor, riots, fires, war, storms, explosions, breakdowns or machinery, railroad embargoes or interventions, failure or delay of manufacturers or of persons from whom Operator is obtaining machinery, equipment, materials or supplies to deliver the same, or other causes beyond its control, whether such other causes be the causes herein specifically provided for or not, and whether the cause is or is not existing on the date of this Agreement. Operator shall not, in any event, he liable for loss of or damage to Customer's property, except and only when caused by Operator's failure to use reasonable care in the safekeeping and going is caused in whole or in part, by any act of God or public enemy, or by caused by Operator's failure to use reasonable care in the safekeeping and handling of Customer's property. It is mutually understood that the Operator is not responsible for any changes in the quality of the product stored which might occur in storage due to the possible effect of air, light, temperature or other natural or chemical happenings.

> Losses of any product for which Operator is responsible hereunder shall be determined annually at the end of each year, commencing with the date of



the first receipt of such product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals during the period for which the accounting is made, plus the stock on hand at the end of such period, from the sum of the total receipts during such period plus the stock on hand at the beginning of such period. Normal losses shall be presumed to be ½ of 1% per month of receipts plus maximum amounts in storage during the period for which accounting is made and such amounts shall be deducted from any claims for losses.

- DEFAULT: Should Customer default at any time in the prompt payment of any of the monies due hereunder, or in the prompt performance and observance of any of the terms, or conditions of this Agreement, and should any such default, not relating to the payment of money, continue for thirty (30) days or more after written notice thereof by Operator to Customer, or should Customer go into bankruptcy voluntary, or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly fee for the whole unexpired term hereof together with all other accrued charges, shall, at the option of Operator, become immediately due and payable.
- DAMAGES: In consideration of the rates for monthly fees and other charges set forth herein (it being recognized that higher charges would be made for the limitation of liability set forth in this paragraph) it is understood and agreed that Operator shall in no event be liable for more than actual cash value, for any product loss or damage. Operator shall not be liable for special or consequential damages, no matter how such loss or damage shall have occurred or been caused. Customer is not liable for operational loss or damage to the facility during the term of this Agreement.
- 10. ASSIGNMENT: This Agreement shall be binding upon and inure to the benefit of the successors and assigns of each of the parties hereto.
- 11. AGREEMENT: This Agreement including the attached Form PD-63 and Schedule, is complete and contains all warranties and representations which form the basis of this Agreement. There exist no other representations or warranties unless they are enumerated herein. No amendment or modification of this Agreement shall be effective or binding unless such modification is in a written form signed by both parties hereto.

Each numbered paragraph or clause herein to this Agreement stands on its own and if any numbered paragraph or clause is held to be invalid or unenforceable, such clause shall be held separated and severable from this Agreement and the remaining Agreement shall remain in full force and effect.

If a conflict arises between the specific meaning or application of a term, clause or paragraph of the Agreement language and the accompanying





schedule and Form PD-63; the language and specific meaning of the accompanying schedule and Form PD-63 shall control and be followed.

12. NOTICES: All notices from one party to the other shall be directed to the appropriate address below or such other address or addresses as either party shall notify the other in writing:

OPERATOR: Time Oil Co. P. O. Box 24447, Terminal Annex, Seattle, WA 98124

CUSTOMER: Koppers Company, Inc.
5317 Southwest Avenue, St. Louis, Mo 63110

IN WITNESS WHEREOF, this Agreement has been made and executed by the parties hereto as of the day, month and year first hereinabove written.

Attest:	OPERATOR: TIME OIL CO.
Secretary	By:
	CUSTOMER: KOPPERS COMPANY, INC
	By:
Secretary	its

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FORM PD-63 Page 1 of 5

# TERMS AND CONDITIONS APPLICABLE TO THE SALE OF MATERIAL, EQUIPMENT OR SERVICE TO KOPPERS COMPANY, INC., AND ANY OF ITS SUBSIDIARY AND ASSOCIATE COMPANIES

(The "Purchaser" in each case being called "Koppers")

#### 1. SELLER'S RESPONSIBILITY (INDEMNITY)

Seller shall defend, indemnify and hold harmless Koppers from all losses, claims, liabilities, expenses and costs arising from damages to property or injury to person (including death) occurring in connection with performance of the work under this agreement unless such damage or injury was caused by the sole negligence of Koppers; provided however, Seller shall defend, indemnify and hold Koppers harmless from all such losses, claims, liabilities, expenses and costs whether or not caused by Koppers' sole negligence, if the same arise from damages caused by or to property, tools or equipment furnished by Seller, or subcontractors, or the officers, agents or employees of either, or from injuries to persons (including death) in the employ or service (whether as agents, independent contractors, employees, licensees or invitees) of Seller, its subcontractors or suppliers.

#### 2. WORKMEN'S COMPENSATION PUBLIC LIABIL-ITY INSURANCE AND AUTOMOBILE LIABILITY INSURANCE REQUIREMENTS

Seller shall properly maintain coverage under the following:

- a. Applicable Workmen's Compensation, Occupational Disease and Employers Liability Acts. Employer's Liability Insurance shall be in the amounts of at least \$100,000 for injury to any one person and at least \$100,000 for injury to more than one person in any one accident.
- b. United States Longshoremen's and Harbor Workers Compensation Acts if applicable.
- c. Automobile Liability Insurance (owned, non-owned, and hired vehicles) with the following limits: \$250,000 each person and \$500,000 each occurrence for bodily injury and \$250,000 each occurrence for property damage.
- d. Comprehensive General Liability Insurance with the following limits: \$500,000 each occurrence for bodily injury and \$250,000 each occurrence for property damage; and, endorsements extending the comprehensive liability insurance to cover contractual liability, completed operations liability, product's liability, "x" exclusion (blasting or explosion), "c" exclusion, (collapse or structural injury), "u" exclusion, (underground).

#### 3. CERTIFICATES

Before beginning any work at the job site, Seller shall deliver to Koppers, certificates (in a form satisfactory to Koppers) evidencing the required coverages and shall keep current certificates on file with Koppers until such work is completed. Such certificates shall, among other things:

- a. Indicate the expiration date of each policy.
- b. Contain a statement that such policies will not be cancelled or amended until after at least ten days advance written notice to Koppers.
- c. Contain a statement reading substantially as follows: "This insurance covers liability assumed by the insured under Contract No. \_\_\_\_\_\_ between the insured and Koppers Company, Inc.

#### \*4. RESPONSIBILITY FOR LOSS OR DAMAGE

All risks of loss or damage, howsoever caused, to property owned or controlled by Seller or his employees and to work not yet accepted shall be borne by Seller and in no event shall Koppers have any responsibility therefore, even if caused by Koppers' sole negligence.

#### 5. DEMURRAGE

Seller agrees to pay all demurrage which may accrue on all cars, trucks or vessels containing material or equipment for use by Seller in connection with the work hereunder and shall be solely responsible for the unloading, checking and storage of such material or equipment.

#### 6. INSPECTION

Seller agrees to provide sufficient, safe and proper facilities at all times for the inspection of the work hereunder by Koppers or its representatives, or, if work is being performed by Koppers for a customer, by such customer or its representatives.

#### 7. CLAIMS AND LIENS FOR LABOR AND MATERIAL

Seller shall promptly pay all just claims for labor and/or material and shall promptly discharge all liens therefore arising out of or in connection with the work hereunder. Koppers may retain out of any money due or to become due to Seller from Koppers, an amount sufficient to satisfy any such claims or

PD-63 Rev.3

liens until furnished satisfactory evidence that all liens and claims have been discharged or satisfied; provided, however, that Koppers shall not make any payment of said money so retained otherwise than to Seller in the event that, and so long as, Seller shall bona fide contest the validity of the claim in respect whereof such amount was so retained. Should there prove to be any such lien or claim after all money due from Koppers to Seller has been paid, Seller shall immediately reimburse Koppers all moneys paid by Koppers in discharging or satisfying any such lien or claim.

#### 8. NON-PERFORMANCE OF WORK

Should the Seller in the judgment of Koppers at any time refuse or neglect to supply a sufficient number of properly skilled workmen or sufficient materials of the proper quality or fail in any respect to prosecute the work hereunder with promptness, skill and diligence, Koppers shall have the right to immediately terminate this agreement and Seller's right to perform hereunder. In any such case Koppers, or its representatives, may enter upon the premises, and, for the purpose of completing the work hereunder, take possession of all materials, tools and equipment thereon. The Seller shall not be entitled to receive any further payment under this agreement until the work hereunder shall be wholly finished, at which time, if the amount which should have been due to Seller from Koppers under this agreement shall exceed the expense incurred by Koppers in finishing the work hereunder, such excess shall become due to Seller from Koppers, but if such expense shall exceed such amount, such difference shall become due to Koppers from Seller.

#### 9. WAIVER OF BREACH

Any failure by Koppers to enforce or require the strict keeping by Seller of the terms and conditions of this agreement shall not constitute a waiver by Koppers of any such breach of the terms and conditions and shall not effect the right of Koppers at any time to avail itself of such remedies as it may have for any such breach of such terms and conditions.

#### 10. PERSONNEL

a. Koppers Company, Inc. is in accord with the objectives of equal employment opportunity. Seller is therefore requested, in formulating his labor relations policies and practices, to join with Koppers in carrying out these objectives so as to insure that no employees or applicants shall be discriminated against because of race, creed, color, sex or national origin. Seller should conspicuously post notice to this effect at his place of business and should

so advise all labor unions with which he has any contract

- b. Seller will coordinate all his labor relations policies and practices with Koppers except that, insofar as the hiring of men is concerned, Seller will formulate his own independent policies and practices consistent, however, with Paragraph a. above and Seller's representation as to the labor unions and labor in his quotation.
- c. Seller shall at all times maintain good order and discipline among his employees and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him.
- d. Seller shall confine his employees and all other persons who come onto the premises at Seller's request for reasons relating to this purchase order, to that portion of the job site where work under this purchase order is to be performed or to roads leading to and from such work site.
- e. The following paragraph is applicable to Engineering and Construction Division work only:
  - In the event the Seller was not at the pre-job conference, he should make himself aware of the contents of the pre-job conference minutes and make special notes of those areas affecting his work. Minutes of the pre-job conference are on file at the jobsite office. Excerpts affecting the Seller's work will be made available upon request.
- f. The following paragraph is applicable to all Koppers projects except those of its Engineering and Construction Division:

In the event Seller is required to hold a prejob conference by his Labor Union Agreements, he shall give Koppers ample prior notice of the conference and invite Koppers' designated field representative to attend.

# 11. REMOVAL OF RUBBISH, WASTE, TOOLS AND SURPLUS MATERIAL

Seller shall not allow waste material or rubbish to accumulate in or about the job site, but shall promptly remove the same and at the completion of the work shall remove all rubbish from and about the site, and all tools, scaffolding and surplus material belonging to Seller, its agents, employees or contractors, and shall leave the work hereunder clean and ready for use.

#### 12. GUARANTEE

a. Seller guarantees that all materials shall be new, unless otherwise specified, and both

workmanship and materials shall be of good quality and meet the specifications and requirements of this contract.

- b. Seller shall repair, or remove and replace, at his own expense and at Koppers' convenience, workmanship or materials which prove to be defective at any time within one year from the time of final acceptance of the work by Koppers.
- c. In addition to the guarantees specified above, Seller shall procure and pass on to Koppers guarantees, parts lists and operating instructions received from all equipment manufacturers for equipment supplied by Seller under this agreement.

#### 13. SITE INVESTIGATION

It is understood that the Seller has fully inspected the site of the work or has had the opportunity for such inspection and knows and fully appreciates the local conditions to be encountered in the performance of the work hereunder. Seller has taken such conditions into consideration in his bid or proposal and no claim will be allowed due to any lack of understanding the site conditions.

#### 14. EQUIPMENT CONDITION

Seller's equipment shall be in first class operating condition upon arrival at the job site and shall be adequate and properly maintained to carry on the work as required.

#### 15. ASSIGNABILITY

- a. Seller shall not assign, transfer, convey, subcontract or authorize disposition of this agreement or its right, title, or interest in or to the same or any part thereof without the previous consent in writing of Koppers, and it shall not assign by power of attorney or otherwise any of the moneys to become due and payable under this agreement without like consent.
- b. In the event of an approved subcontractor, Seller shall be fully responsible for the performance of his subcontractors in all matters including, but not limited to, accounting, cost distribution, purchasing, labor and material control and proper and economical performance of the work.

#### 16. FINAL PAYMENT

a. Final payment of all moneys due but not previously paid to Seller hereunder shall be made in accordance with the type portion of this purchase order after acceptance by Koppers of the completed work, provided Seller shall have given to Koppers evidence satisfactory to it that all liens, claims, obligations and liabilities against the premises or chargeable to Koppers and/or Koppers' customer have been fully paid, satisfied and released.

b. Final payment so made by Koppers shall not be construed as a waiver of any breach hereof by Seller or as an acceptance of defective work or of work not in accordance with specifications and drawings.

#### 17. CHANGES/CONVENIENCE TERMINATION

- a. Koppers may, from time to time by written instructions, directions and/or revised drawings, make changes in the work to be performed by Seller which may include additional work, delays in the performance of work, omission of work previously ordered, or termination of the entire contract at the sole convenience of Koppers. The provisions of the contract shall apply to all such changes and modifications with the same effect as if they had been embodied in the original purchase order.
- b. Additional work authorized by Koppers' designated field representative shall be performed only if Authorization Form F-20 has been properly signed by both parties. Any additional work by Seller shall only be compensable if authorized pursuant to the aforementioned Form F-20 and Paragraph a. above and provided Seller has registered his claim for additional moneys within thirty days after receiving such authorization for additional work. Any claim made thereafter shall be disallowed.
- c. Any decrease or increase in time required for performance because of any change made by Koppers in the work to be performed shall be submitted to Koppers in writing within thirty days of the time the change is ordered.
- d. In the event deductions from work result in a change in the value of the work or the contract is terminated at the convenience of Koppers, the contract price shall be equitably adjusted, provided that such adjustment shall not exceed the total contract price, nor allow any amount for anticipated profit for performance not rendered. Seller shall submit his revised price and information supporting the same for the deduction from or termination of the work within thirty days of the change. Upon receipt of the termination notice or directions to omit work, Seller shall stop work to the extent specified in the notice and take such other action as may be necessary, or as Koppers may direct,

for the transfer, protection, preservation of property and contract rights related to the termination or omission of work, and to minimize the costs of such termination or omission of work to and for the benefit of Koppers.

#### 18. DEFECTIVE WORK

At any time during the progress of the work, Seller shall within twenty-four hours after receiving written notice from Koppers, proceed to remove from the premises all defective materials, whether assembled or not, and to dismantle all portions of the work which are defective, unsound, improper, or in any way fail to conform to the requirements of specifications and drawings. Seller shall replace all such defective work and/or materials at his own expense.

#### 19. SAFETY

- a. Seller shall assume responsibility for the safety of any person who enters the work area at the implied or actual invitation of Seller.
- b. Seller and all his employees and subcontractors shall keep their work area free from unsafe conditions and shall comply with all applicable provisions of Koppers Safety Manual and such other reasonable rules and regulations which may be in force at the work site.

#### 20. CONSTRUCTION BY OTHERS

The work to be performed by Seller may include only a part of Koppers overall construction program at the work site. Koppers reserves the right to complete other phases of any such program by placing orders with other suppliers or performing portions of the work with its own forces. When others are involved, Seller shall afford them opportunity for the delivery and storage of their materials and execution of their work and shall cooperate so the entire work proceeds in an orderly manner.

#### 21. APPLICABLE LAWS & REGULATIONS

Any provision by applicable and valid Federal, State, Local Law, Ordinance, rule or regulation shall apply to this work whether or not it is specifically mentioned herein.

#### 22. ACCOUNTING INSPECTION AND AUDIT

1.

a. Unless otherwise specified, Seller shall check all labor and materials entering into the work covered by this purchase order and keep such full and detailed accounts as may be required to meet the needs of Koppers system of accounting.

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b. All books and records of Seller relating to this purchase order shall be subject to audit by Koppers' authorized representative or by an independent certified public accountant at all reasonable times during normal business hours.

#### 23. EXISTING FACILITIES

Seller shall not remove, connect, disconnect, change or alter in any way pipelines, sewers, conduits, cable or other utilities existing at the work site except when so authorized, in writing, by Koppers.

#### 24. KOPPERS SUPPLIED MATERIAL

It shall be Seller's responsibility to protect and account for all Koppers supplied material from the time of delivery to Seller. Suitable weather protection shall be furnished by Seller for all materials requiring such protection. Surplus materials shall be returned by Seller to Koppers before he leaves the work area.

#### 25. PREMIUM TIME

- a. If Seller chooses to work outside the normal workweek for his own convenience, Koppers shall not be liable for any premium charges involved. However, no such overtime work shall be performed without specific approval of Koppers.
- **b.** Seller shall, at the written request of Koppers. work his men outside of the normal workday or workweek. If the purchase order price is based on a normal workday or workweek the following shall apply: Seller shall be reimbursed for his out-of-pocket overtime and/or premium payments together with taxes and welfare payments required by legal or union regulations with no addition for overhead or profit. On all overtime or premium time chargeable to Koppers, Seller shall prepare a daily list of his forces showing hours worked and wage rates. This list must be submitted to Koppers' designated field representative at the end of each day for his approval. It shall be Seller's responsibility to obtain this signed approval before noon of the work day after the overtime work was performed.

#### 26. SUPERINTENDENCE

Seller shall maintain competent superintendence on the job site during construction. Seller's designated job site representative shall fully represent Seller. All directions given to such supervisor or his duly authorized representative shall be binding on Seller.

#### 27. KOPPERS USE OF COMPLETED WORK

Koppers may, prior to the completion of all the work to be performed under this purchase order, and the acceptance thereof by Koppers, enter upon, and use any portion of said work, without any compensation whatever to Seller for such use, and such taking possession and use shall not be deemed an acceptance of the work so taken and used, or of any part thereof.

#### 28. DRAWINGS AND RECORDS

Title to the originals and all copies of all plans, blueprints, drawings, specifications, schedules, computation data, bills of material, studies, reports and other items and written media furnished to Koppers by Seller, or prepared by or for the account of Seller in connection with the performance of the work called for by this purchase order, shall be and remain in Koppers and, if requested by Koppers, shall promptly be delivered to Koppers upon completion of the work. Seller may retain copies of such records applicable to the work done by it under the purchase order as may be reasonably necessary for Seller's records.

#### 29. DISPUTES

a. Any dispute arising under this Agreement which is not resolved by agreement shall be decided by Koppers. Such decision shall be reduced to writing, and a copy thereof mailed or otherwise furnished to Seller. Within thirty days after date of receipt of such copy Seller may notify Koppers, in writing, of its disagreement with the decision. In the absence of such notice, such decisions shall be final. In the event Seller notifies Koppers of its disagreement Seller may appeal that decision by pursuing any right or remedy it may have against Koppers at law or in equity in any court of competent jurisdiction except as set forth in Paragraph b. below.

b. Pending the final court decision of the dispute Seller shall diligently proceed in accordance with the decision of Koppers pursuant to Paragraph a. above.

#### 30. HEADINGS

The headings for the clauses of this Agreement are for the convenience of the parties only and are not to be considered a part thereof for the purpose of construction, interpretation, limiting the scope of a clause or otherwise.

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DONALD L. SCHWENDIMAN PROPERTY DEPARTMENT

285-2400

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SEATTLE
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LOS ANGELES



### TIME OIL COMPANY

12005 N. BURGARD, P. O. BOX 03117, ST. JOHNS STATION, PORTLAND, OREGON 97203

October 26, 1970

Mr. Lowell E. Gutzler Wood Treating Chemicals Co. 5137 Southwest Avenue St. Louis, Missouri 63110

Dear Lowell:

Enclosed is an executed copy of the amended schedule to our Agreement dated August 1, 1970.

Sorry this was so long in getting back to you.

Regards.

Yours very truly,

Newton PLeak

Newton P. Lesh

NPL/s Encl.

AMENDED SCHEDULE

TERMINAL:

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TIME OIL CO., Portland, Oregon.

DATE OF AGREEMENT:

March 1, 1967 August 1, 1970 amended schedule.

INITIAL TERM OF AGREEMENT:

April 1, 1967 to March 31, 1972.

OPERATOR:

TIME OIL CO.

CUSTOMER:

WOOD TREATING CHEMICALS CO.

PRODUCTS TO BE STORED:

Raw materials in bulk, drums and bags for wood preservatives.

Finished products in bulk and drums.

Also, such other raw materials and finished products specified by the Guatomer: and accepted by the Sperator.

PACILITIES:

Operator will furnish Gustomer the following facilities:

Storage tanks - one (1) tank with a shell capacity of approximately 38,000 gallons, three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of raw or finished materials on pallets in drums and bags.

SERVICES:

Operator shall receive the raw materials from railroad tank cars or freight cars and/or trucks and shall deliver such products into storage tanks and/or warehouse.

Storage and Handling

Operator shall deliver the finished products into storage, trucks and/or railroad cars.

Operator shall mix or blend products at a temperature not to exceed 180 deg. F.

HANDLING AND TRANSPER CHARGES:

The only charges for the facilities and services herein are the following:

\$615.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.

One cent (0.01) per gallon for blending and shipping pentapetroleum or LST type solutions shipped in tank cars, tank trucks or drums that can be bulk or tank blended. These products are Customer's products known as:

-1-

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41608

CHARGES: cont.

- Woodtox Preprime RTU
- 2. Woodtox 140 RTU
- Presstreat
- Woodtox 109 RTU
- Woodtox 109 w/o Penta

Other products of similar type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Three cents (0.03) per gallon for blending and shipping concentrate type solutions in tank cars, tank trucks or drums. These products are Oustomer's products known as:

- Timbertox 40 Concentrate
- 1. Timbertox 40 Concertate
  2. WR 340 Concentrate
- Woodtox Preprime Concentrate
- Woodtox 140 Concentrate
- Inhibitor L
- Penta Wood Preservative Concentrate

Other concentrate type solutions can be added from time to time by Gustomer upon written acceptance by the Operator.

Five cents (0.05) per gallon for filling 55 gallon drums.

One cent (0.01) per gallon for blending contaminated products returned to storage and/or blending Woodtox 109 w/e Penta to include Penta.

Seventy-five (0.75) cents for each 55 gallon drum of additives shipped that have been in storage and are shipped without blending with other products.

Blending, shipping and drum filling charges are to be invoiced by Operator to the Gustomer on the first day of each month for the shipments made during the previous month and Gustomer agrees to pay charges within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed guards as specified in Sections B.3, D.9 (a) and 13 (c) of the Agreement to which this Schedule is annexed and which it is a part.

It is agreed by the narties hereto that the Schedule attached to the Agreement dated the 1st day of March, 1967, shall be superceded and replaced in its entirety by this Amended Schedule effective August 1, 1970.

It is further agreed that said Agreement dated the 1st day of March, 1967 is further amended as follows:

On Page 1, Section A.FACILITIES, Paragraph 2, line 7 after the word Agreement shall be added "Gustomer shall, however, inform Operator of any irregularities or deficiencies discovered during any such inspection.

-2-

TOLS010915



On page 2, Paragraph 3, line 6. The amount \$5.8125 shall be substituted for the amount of \$4.25 stated therein.

On page 4, Paragraph 6, line 3. The word "similar" shall be deleted and after the word "cause" shall be added "beyond the control of Operator".

On page 5, Paragraph 8, line 2. The following shall be substituted for Paragraph 8 in its entirety. "Customer's representative shall have access to the truck and rail car loading rack, tanks and warehouse covered by this agreement, as a matter of course, but all other areas of Operator's terminal facilities shall be closed to Customer's representatives except when accompanied by a representative of Operator. While on Operator's terminal premises, Customer's representative shall comply at all times with any rules established from time to time by Operator in Connection with the operation of the terminal."

On page 5, Paragraph 9. (a) wherever the amount of \$2.71 is stated the amount of \$3.875 shall be substituted therefor.

On page 8, Paragraph 13 (a), the following shall be substituted therefor:

suspended by either party, in whole or in part, without liability, in the event of act of God, war, riot, fire, explosion, flood, drought, sabotage, inability to obtain fuel or power, accident, national, state, or other governmental laws, regulations, rules or orders, or any other circumstance of like nature beyond the reasonable control of such party, or labor trouble, strike, walkout, or injunction, whether or not any such delays within the reasonable control of such party, which delays, prevents, restricts or limits the performance of this agreement or the consumption, sale, use or end use of the products or any product manufactured or processed therefrom or therewith. The affected party shall invoke this provision by promptly notifying the other party of the nature and estimated duration of the suspension. At Customer's option, the period specified for processing and/or delivery of the products hereunder shall be extended by the period of delay occasioned by any such suspension and processing or deliveries not performed or made during such extention, or the period specified for processing and/or delivery shall not be extended and the total contract quantity hereunder shall be reduced by the processing or deliveries not performed or made during such suspension and, in either event, the contract shall otherwise remain uneffected."

The following provisions are incorporated therein:

Disposal of waste shall be for the Customer's account but subject to Customer's prior approval of expenditures for that purpose.

Customer shall reimburse Operator for fines or penalties imposed upon Operator by a court of law and paid in full by Operator, which fines are for pollution, expressly prohibited by statute, proved in said court to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement. Customer shall also re-imburse Operator for all attorneys fees and costs of suit incurred in the defense of any suit brought against Operator for pollution proved to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement.

-3-

All other of the terms and provisions of said Agreement shall remain the same and in full force and effect.

Witness:

TIME OIL CO., Operator

R. D. Abendroth, President

Witness;

WOOD TREATING CHEMICALS CO.

By Lowell E.

aut. Levetay

#### CONTRACT

The parties to this agreement are Time Oil Co. (hereinafter termed owner) and Northwest Vacuum Truck Service, Inc. (hereinafter termed contractor) whereas:

Owner has a volume of earthen material located in Portland, Oregon and owner is desirous of having that material removed.

Contractor is willing to undertake that task upon the terms and conditions set forth below.

Therefore, in consideration of the agreements contained herein, the parties agree as follows:

- 1. Contractor agrees to remove the material from its present location, load it into suitable transportation vehicles and transport it to a disposal facility approved by the Oregon Department of Environmental Quality.
- 2. The material to be removed by contractor is generally set forth on the drawing labeled exhibit 1, attached hereto and incorporated by this reference. Prior to work under this agreement, a representative of owner will meet with contractor at the site and the extent of the material to be removed will be more specifically delineated at that time.
- 3. The commencement date for work will be February 21, 1985 or such other date as may be agreed upon by the parties following coordination with the Department of Environmental Quality and the authorized disposal facility. Work is intended to be divided into two phases. First phase consists of material removal to an agreed upon depth. Then there will be a several day delay while additional tests are conducted to determine if further removal is required. If so, phase two removal actions are to be effected. Should there be any need to continue removal, above process is to be repeated until ultimate removal is accomplished.
- 4. For each day worked, owner agrees to pay contractor the sum of 1200 dollars for labor and equipment pertaining to soil removal plus 600 dollars for each truckload of soil transported. A day worked shall be one wherein earth moving equipment, necessary to perform the work, has been utilized to the fullest, reasonably possible, extent for a period of not less than 8 hours. Truck shall be a standard 18 yard rated capacity vehicle. Payment will be made upon completion of the work and receipt by owner of written acknowledgement from the approved disposal facility that all material removed and transported by contractor has been received at that facility.
- 5. Contractor indemnifies and agrees to defend and hold owner harmless from any and all costs, claims, liabilities and damages arising out of contractors work under this contract.
- 6. Contractor hereby declares that it is engaged as an independent contractor and agrees to perform the work as independent contractor and not as an employee of owner. Contractor has and hereby retains the right to exercise full control and supervision of the work and full control over the employment, direction, compensation and discharge of all persons assisting in the work.

- Contractor agrees at its expense to obtain all governmental permits, licenses and approvals and comply with all laws, rules, regulations and requirements now or hereafter existing necessary for the accomplishment of the work to be performed by contractor under this agreement.
- Contractor especially acknowledges its understanding that portions of the material to be removed, transported and disposed of under this agreement have been found to contain commercial pentachlorophenol in concentrations ranging from 0 ppm to 1820 ppm. Contractor agrees to take all necessary precautions for the protection of persons and property that may be required or prudent in the removal and transportation of that material.
- 9. Contractor agrees to maintain workmans' compensation insurance in the form and amounts required by the laws of the state of Oregon and broad form comprehensive public liability insurance with minimum limits of \$1 million per person and \$1 million per accident for bodily injury and \$500,000 per accident for property damage. Contractor shall promptly deliver to owner certificates of said insurance, naming owner as an additional insured before commencing work and such certificate shall provide that said insurance shall not be cancelled prior to 30 days by written notice to owner.
- 10. Contractor agrees that before commencement of any work hereunder, it will promptly furnish owner with a faithful performance bond in an amount to 53,000 dollars guaranteeing completion of all work and performance of all obligations undertaken by contractor under this agreement.
- 11. The nature, validity and interpretation of this contract shall be governed by the laws of the state of Washington.

Dated this 19th day of February 1985.

OWNER Time Oil Co. CONTRACTOR

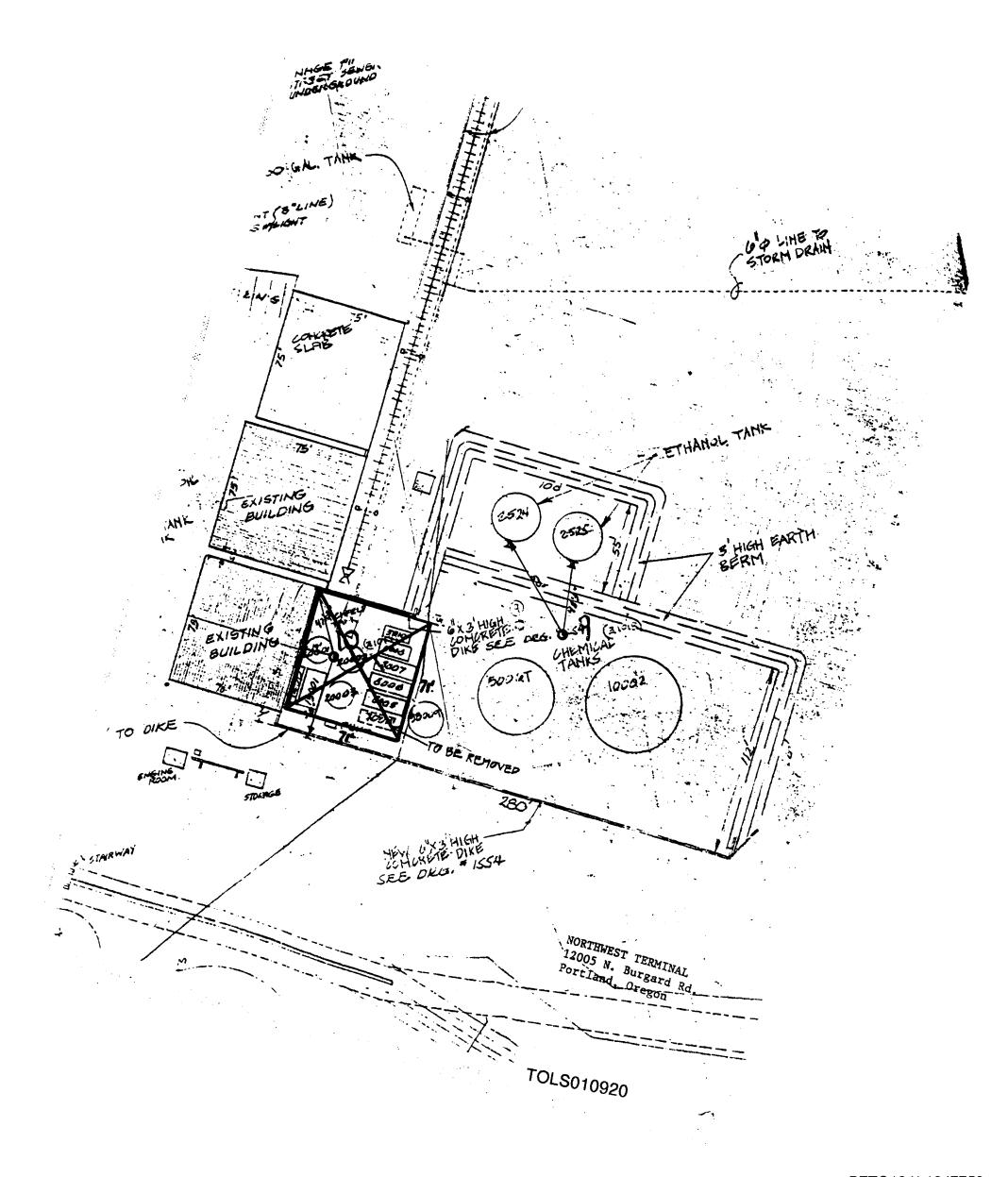
Northwest Vacuum Truck Service Inc.

John P. Denham

Environmental Manager

John H. Somes

General Manager



INSURING COMPANY:

- ☐ SAIF CORPORATION
- ☐ SAIF CORPORATION OF OREGON

# Certificate of Coverage

Date of Issue: FEBRUARY 25, 1985

This certifies that	NW VACUUM	TRUCK SERVICE	INC.		, Policy No.	426329
		eriod ending date of Workers' Compens			or bayment	of compensation to subject
Oregon workers.		.,		,	<b></b>	-,,,

TO:

TIME OIL CO,

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2737 W. COMMODORE WAY

SEATTLE, WASHINGTON 98199

ATTN; JOHN DENHAM

Michael J. Dora Director Underwriting Division

Michaelf. Dora

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CONTRACT BOND	Bond No H 34156
KNOW ALL MEN BY THESE PRESENTS, T	NORTHWEST VACUUM TRUCK SERVICE, INC
	. 43 - PORTLAND, OREGON 97217
HERITAGE INS	URANCE COMPANY  A TILINOTS Sorporation, called the Surety, are held and firm
OF AMERICA, TIME OIL CO.	sorporation, cance the servey, are nell and in
bound unto	
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called the owner in the sum ofFIFTY_T	HREE THOUSAND AND NO/100THS
for the payment whereof said Principal and S	Dollars (\$ 53,000.00**
with the Owner for REMOVAL OF EAR	eement, dated MARCH 12, 19 85, entered into a Contr THEN MATERIAL OWNED BY OWNER FROM ITS PRESENT
LOCATION, LOAD IT INTO SUITABL	LE TRANSPORTATION VEHICLES AND TRANSPORT IT TO A
DISPOSAL FACILITY APPROVED BY	THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY.
a copy of which is by reference made a part h	
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NOW, THEREFORE, THE CONDITION OF Contract, and indemnify and save harmless the	nereof; THIS OBLIGATION IS SUCH, That if the Principal shall faithfully perform the Owner from all loss, cost or damage which Owner may suffer by reason ofta
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#### HERITAGE INSURANCE COMPANY OF AMERICA

LINCOLNWOOD, ILLINOIS

#### Power of Attorney

rincipal office in Lincolnwood, Illinois, pursuant to the following resolution, adhe 9th day of March, 1979, to wit:  "The President, or any Vice-President, or other officer designated by the everally, to make, execute and deliver a power of attorney constituting as Attofficers may select from time to time."  does hereby make, constitute and appoint J.T. Kohoutek, C.J. Huffman and/officers and Iswful attorney(s)-in-fact, with full power and authority hereby conknowledge and deliver in its behalf, and its act and deed, as follows:  The obligation of the Company shall not exceed the sum of five hundred the distribution of the Company thereby as fully and to the same extentionized officers of the Heritage Insurance Company, and all the acts of said preby ratified and confirmed.	power No. H 34156  ompany, a Corporation in the State of Minois, having opted by the Board of Directors of the said Company of the Board of Executive Committee shall have authority orney-in-Fact such persons, firms or corporations as such a such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as such persons, firms or corporations as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a such persons as a
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	these presents to be signed by its President and/or
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	Vincent M. Giscinto, President
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Maria Maria	Notary Public  JOSEPH D. UDONI OTARY PUBLIC, State of Elinois
	Notary Public  JOSEPH D. UDONI OTARY PUBLIC, State of Elinois Qualified in State of Elinois
KNOW ALL MEN BY THESE PRESENTS: That the Heritage Insurance Company, a Corporation in the State of Illinois, he incigal office in Lincolawood, Illinois, pursuant to the following resolution, adopted by the Board of Directors of the said Comp why day of March, 1979, to will.  The President, or any Vice President, or other officer designated by the Board of Executive Committee shall have autility to make a secure and deliver a power of attorney constituting as Attorney-in-Fact such persons, firms or corporations as one shereby make, constitute and appoint 1.T. Kohoutek, C.J. Huffman and/or J.C. Baumann of Seattle in the State of Washing rue and Invited attorney-shin-fact, with full power and suthority hereby conferred in its name, place and stead, to sign, execundled and defiver in its behalf, and its act and deed, as follows:  The obligation of the Company shall not exceed the sum of five hundred thousand (\$500,000.00) dollars.  d to bind Heritage Insurance Company thereby as fully and to the same extent as if such bond or undertaking was signed by it theorized officers of the Heritage Insurance Company, and all the acts of said Attorney(s) pursuant to the authority herein givesly stuffed and confirmed.  IN WITNESS WHEREOF, the Heritage Insurance Company has caused these presents to be signed by its President and officer described herein, and who executed the preceding insurance Company, to me personally known to be the individent of the Company and the said Corporate Seal and alignature as an officer were duly affixed and subscribed to strument by the authority and direction of the said Company signasid, and that the seal affixed to the preceding instruction of forces.  BY TESTIMONY WHEREOF, I have hereunto set my hand, and affixed my official seal at Lincolawood, Blinois, the day a corporate Seal of said Company, and the said Corporate Seal and alignature as an officer were duly affixed and subscribed to strument in sow in force.  BY TESTIMONY WHEREOF, I have hereunto set my hand, and affixed on of the State o	
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#### NOTICE OF CANCELLATION OR NONRENEWAL OF POLICY

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(2) MARSH & MC LENNAN, INC.		COMMERCIAL	CP 8428333	SEATTLE, WA.	DATE AND PLACE OF MAILING
TO A	ALL INSURED	S, AND LOSS PA	YEES NAMED IN SA	ID POLICY:	
NONRENEWAL OF POLICY.			CANCELLATIO	N OF POLICY AT CO	MPANY ELECTION.
BY VIRTUE OF THIS NOTICE, YOU FIED THAT THE COMPANY HAS E	_	- '	CANCELLATIO	N OF POLICY FOR N	IONPAYMENT OF PREMIUM
NEW THIS POLICY WHICH WILL EXI			BY VIRTUE OF	THIS NOTICE. Y	OU ARE HEREBY NOTIFIED
STANDARD TIME	19		THAT THIS PO	LICY IS CANCELED	AS TO ALL INTERESTS IN
1. NAMED INSURED AND ADDRESS			SURED, CANCE	LLATION SHALL BE	EFFECTIVE AT 12: 01 A.M.
Γ				AEUNE 9.	
CP 8428333					•
NORTHWEST VACUUM TRU P. O. BOX 24402		•	at supported to	oon as practical after on a demand, if premium h ant for the premium a	premium adjustment will be made sancelistion becomes effective, or as not been paid, a statement will erned. This notice is sent by the
SEATTLE, WASHINGTON	98124	(c)		pany that issued the a being the one indicate	bove numbered policy, said comed by 🖾
	•		ØSAF □ GEN □ FIR: □ SAF □ SAF	ECO INSURANCE CON IERAL INSURANCE C	MPANY OF AMERICA OMPANY OF AMERICA ANCE COMPANY OF AMERICA PRANCE COMPANY
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			8Y.\$	TOM VOMBREE	REPRESENTATES 168
CD 01:20777				TE PLEASE CONTACT YOUR	AGENT IMMEDIATELY SHOULD THERE
CP 8428333 TIME OIL COMPANY			AE A	INY QUESTIONS IN REGARD	TO THIS NOTICE
2737 WEST COMMODORE W	IAV				
SEATTLE, WASHINGTON	98199	(c)			
SEATTLE, MASHINGTON	20122				
ATTN: JOHN DENHAM			٤,		
ATIN. OUTV DESTAT		. •	-:	·	
— 3. MORTGAGEE OR LOSS PAYEE AND	D ADDRESS				
CP 8428333 TESORO PETROLEUM CORP CORPORATE INSURANCE D 8700 TESORO DRIVE					
	78286	(c)			
	,				

TOLS010924

NAMED INSURED COPY OR MORTGAGEE OR LOSS PAYEE COPY

PRINTED IN U.S.A

Marsh & McLennan, Incorporated Marsh & McLennan Building 720 Olive Way Seattle, Washington 98101 Telephone (206) 223-1240

March 5, 1985

SANTANTANTAN SANTAN

Time Oil Company 2737 West Commodore Way Seattle, Washington 98199

Attention: John Denham

Account Representative

Attn Mr. Steve Skeel

Northwest Vacuum Truck Service, Inc.

Enclosures mf

cc:

Attention. Com Demini
Insured Northwest Vacuum Truck Service, Inc
Company and Policy No. Safeco
<u>Various - See attached</u> certificate
Coverage
Location Post Office Box 24402
Seattle, Washington 98124
( ) Policy enclosed
(xx) Certificate xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
( ) Premium invoice enclosed for
( ) Premium invoice will be mailed to you by the Insuror
( ) Mortgage or Loss Payable clause enclosed
( ) Contract of Sale clause enclosed
( ) Please return for cancellation, Policy No.
( )
Sincerely yours,
MARSH & McLENNAN, INCORPORATED
Sickie Stark
By Jackie Starr

## Certificate of Insurance

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER THIS CERTIFICATE DOES NOT AMEND EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES LISTED BELOW

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(206) 223-1240

NAME AND ADDRESS OF INSURED

NORTHWEST VACUUM TRUCK SERVICE, INC. POST OFFICE BOX 24402 SEATTLE, WASHINGTON 98124

COMPANIES	AFFORDING	COVERAGES
COM VILLE	VI I AISPIE	

**SAFECO** COMPANY A

COMPANY C

COMPANY D

This is to certify that policies of insurance listed below have been issued to the insured named above and are in force at this time. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the

.eriiis, ex	iclusions and conditions of such po	MC/63.		· · · · · · · · · · · · · · · · · · ·		
COMPANY	7,07 05,000,000	COLUMN AND AND AND AND AND AND AND AND AND AN	POLICY	Limits of Liab	ility in Thousan	ids (000)
LETTER	TYPE OF INSURANCE	POLICY NUMBER	EXPIRATION DATE		EACH OCCURRENCE	AGGREGATE
А	GENERAL LIABILITY  X COMPREHENSIVE FORM	CP 842833	05/30/85	BODILY INJURY	\$	\$
	PREMISES—OPERATIONS  EXPLOSION AND COLLAPSE			PROPERTY DAMAGE	s	\$
	UNDERGROUND HAZARD  DEFORMED HAZARD  DEFORMED HAZARD  CONTRACTUAL INSURANCE  BROAD FORM PROPERTY  DAMAGE  UNDEPENDENT CONTRACTORS	· ·		BODILY INJURY AND PROPERTY DAMAGE COMBINED	s 500,	5 500,
	PERSONAL INJURY			PERSONAL	NJURY	s
	AUTOMOBILE LIABILITY	DA 040022 A	05/20/95	BODILY INJURY (EACH PERSON)	s	
A	COMPREHENSIVE FORM	BA 842833 A	05/30/85	BODILY INJURY (EACH ACCIDENT)	\$	
	HIRED			PROPERTY DAMAGE	S	
	X NON-OWNED			BODILY INJURY AND PROPERTY DAMAGE COMBINED	s 500,	
А	EXCESS LIABILITY    X   UMBRELLA FORM   OTHER THAN UMBRELLA	UL 842833	05/30/85	BODILY INJURY AND PROPERTY DAMAGE COMBINED	,1,000,	<b>\$1,000</b> ,
	FORM					
	WORKERS' COMPENSATION			STATUTORY		
	and EMPLOYERS' LIABILITY		-		s	(EACH ACCIDENT)
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES

As respects the operations of the Insured.

TOLS010926

Cancellation: Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will endeavor to mail \_\_20\_ days written notice to the below named certificate holder, but failure to mail such notice shall impose no obligation or liability of any kind upon the company.

ACCOUNT EXECUTIVE: Jo Ann Crook

NAME AND ADDRESS OF CERTIFICATE HOLDER: Time Oil Company

2737 West Commodore Way Seattle, Washington 98199

Attention: John Denham

. . . .

March 5, 1985

McLENNAN, INCORPO<u>RAT</u>ED

(John C. Day)

ACORD 25 (1-79)

Marsh & McLennan, Incorporated Marsh & McLennan Building 720 Olive Way Seattle, Washington 98101 Telephone (206) 223-1240

June 13, 1985

Time Oil Company 2737 West Commodore Way Seattle, Washington 98199

Attent	ion: John Denham						
	Insured Northwest Vacuum Truck Service. Inc.						
	Company and Policy NoVarious						
	Coverage						
( )	Policy enclosed						
( <sup>x</sup> )	Certificate or policy Copy enclosed						
( )	( ) Premium invoice enclosed for						
( )	( ) Premium invoice will be mailed to you by the Insuror						
( )	Mortgage or Loss Payable clause enclosed						
( )	Contract of Sale clause enclosed						
( )	Please return for cancellation, Policy No.						
( )							
Since	cely yours,						
MARSH	& McLENNAN, INCORPORATED						
	Dee Cracedes  cronander  cunt Representative						
Fnolo	curac						

cc: Northwest Vacuum Truck Service, Inc.

qu	THIS CER	Cert  TIFICATE IS ISSUED AS A MATTER OF INFO  TIFICATE DOES NOT AMEND EXTEND OR	ificate of Insu	CONFERS NO RIGHTS UP	ON THE CERTIFIC. DLICIES LISTED BE	ATE HOLDER.		
	D ADDRESS OF AGENCY			ORDING COVERAGES				
Mar	rsh & McLennan, rsh & McLennan ! O Olive Way	Building	COMPANY A SEE BELOW					
Sea	attle, Wa 9810	1	COMPANY B					
	DAODRESS OF INSURED VACUUM TRUCK SE	ERVICE, INC.	COMPANY C		<u>-</u>			
	J. BOX 24402 ATTLE, WA 9811	24	COMPANY D			·		
This is t	to certify that policies of insura	nce listed below have been issued to the ins	COMPANY E	are in force at this time.	Notwithstanding a	any requirement,		
		er document with respect to which this certifi- sions and conditions of such policies.	cate may be issued or n					
COMPANY LETTER	TYPE OF INSURANCE	POLICY NUMBER	POLICY EXPIRATION DATE	LIMITS OF CIA	EACH OCCURRENCE	AGGREGATE		
	GENERAL LIABILITY  COMPREHENSIVE FORM PREMISES—OPERATIONS EXPLOSION AND COLLAPSE HAZARD	FIREMAN'S FUND INSUR MXX80077222		BODILY INJURY PROPERTY DAMAGE	\$			
	UNDERGROUND HAZARD PRODUCTS/COMPLETED OPERATIONS HAZARD CONTRACTUAL INSURANCE BROAD FORM PROPERTY DAMAGE INDEP. CONTRACTORS		05/30/86	BODILY INJURY AND PROPERTY DAMAGE COMBINED	500	500		
	PERSONAL INJURY			PERSONAL INJURY		500		
	AUTOMOBILE LIABILITY  COMPREHENSIVE FORM OWNED	FIREMAN'S FUND INSUR	ANCECO	BODILY INJURY (EACH PERSON) BODILY INJURY (EACH ACCIDENT)	\$			
	HIRED NON-OWNED	MXXB0077222	05/30/86	PROPERTY DAMAGE BODILY INJURY AND PROPERTY DAMAGE	8			
	EXCESS LIABILITY  UMBRELLA FORM  OTHER THAN UMBRELLA FORM	INTEGRITY INSURANCE (ISX90 42 07	ODMPANY 05/30/86	BODILY INJURY AND PROPERTY DAMAGE COMBINED	1.000	: 1.000		
	WORKERS' COMPENSATION and EMPLOYERS' LIABILITY			STATUTORY	s	(EACH ACCIDENT)		

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES

OTHER

REGARDING THE OPERATIONS OF THE INSURED.

TOLS010928

Cancellation: Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will endeavor to mail \_\_\_\_\_\_\_ days written notice to the below named certificate holder, but failure to mail such notice shall impose no obligation or liability of any kind upon the company.

NAME AND ADDRESS OF CERTIFICATE HOLDER

TIME OIL COMPANY 2737 WEST COMMODORE WAY SEATTLE, WA 98199

ATTN: JOHN DENHAM

ACORD 25 (1-79)

AUTHORIZED REPRESENTAT

The parties to this agreement are Time Oil Co. (hereinafter termed owner) and Northwest Vacuum Truck Service, Inc. (hereinafter termed contractor) whereas:

Owner has a volume of earthen material located in Portland, Oregon and owner is desirous of having that material removed.

Contractor is willing to undertake that task upon the terms and conditions set forth below.

Therefore, in consideration of the agreements contained herein, the parties agree as follows:

- 1. Contractor agrees to remove the material from its present location, load it into suitable transportation vehicles and transport it to a disposal facility approved by the Oregon Department of Environmental Quality.
- 2. The material to be removed by contractor is generally set forth on the drawing labeled exhibit 1, attached hereto and incorporated by this reference. Prior to work under this agreement, a representative of owner will meet with contractor at the site and the extent of the material to be removed will be more specifically delineated at that time.
- 3. The commencement date for work will be February 21, 1985 or such other date as may be agreed upon by the parties following coordination with the Department of Environmental Quality and the authorized disposal facility. Work is intended to be divided into two phases. First phase consists of material removal to an agreed upon depth. Then there will be a several day delay while additional tests are conducted to determine if further removal is required. If so, phase two removal actions are to be effected. Should there be any need to continue removal, above process is to be repeated until ultimate removal is accomplished.
- 4. For each day worked, owner agrees to pay contractor the sum of 1200 dollars for labor and equipment pertaining to soil removal plus 600 dollars for each truckload of soil transported. A day worked shall be one wherein earth moving equipment, necessary to perform the work, has been utilized to the fullest, reasonably possible, extent for a period of not less than 8 hours. Truck shall be a standard 18 yard rated capacity vehicle. Payment will be made upon completion of the work and receipt by owner of written acknowledgement from the approved disposal facility that all material removed and transported by contractor has been received at that facility.
- 5. Contractor indemnifies and agrees to defend and hold owner harmless from any and all costs, claims, liabilities and damages arising out of contractors work under this contract.
- 6. Contractor hereby declares that it is engaged as an independent contractor and agrees to perform the work as independent contractor and not as an employee of owner. Contractor has and hereby retains the right to exercise full control and supervision of the work and full control over the employment, direction, compensation and discharge of all persons assisting in the work.

ENCL. 4

- 7. Contractor agrees at its expense to obtain all governmental permits, licenses and approvals and comply with all laws, rules, regulations and requirements now or hereafter existing necessary for the accomplishment of the work to be performed by contractor under this agreement.
- 8. Contractor especially acknowledges its understanding that portions of the material to be removed, transported and disposed of under this agreement have been found to contain commercial pentachlorophenol in concentrations ranging from 0 ppm to 1820 ppm. Contractor agrees to take all necessary precautions for the protection of persons and property that may be required or prudent in the removal and transportation of that material.
- 9. Contractor agrees to maintain workmans' compensation insurance in the form and amounts required by the laws of the state of Oregon and broad form comprehensive public liability insurance with minimum limits of \$1 million per person and \$1 million per accident for bodily injury and \$500,000 per accident for property damage. Contractor shall promptly deliver to owner certificates of said insurance, naming owner as an additional insured before commencing work and such certificate shall provide that said insurance shall not be cancelled prior to 30 days by written notice to owner.
- 10. Contractor agrees that before commencement of any work hereunder, it will promptly furnish owner with a faithful performance bond in an amount to 53,000 dollars guaranteeing completion of all work and performance of all obligations undertaken by contractor under this agreement.
- 11. The nature, validity and interpretation of this contract shall be governed by the laws of the state of Washington.

Dated this 19th day of February 1985.

OWNER Time Oil Co.

CONTRACTOR

Northwest Vacuum Truck Service Inc.

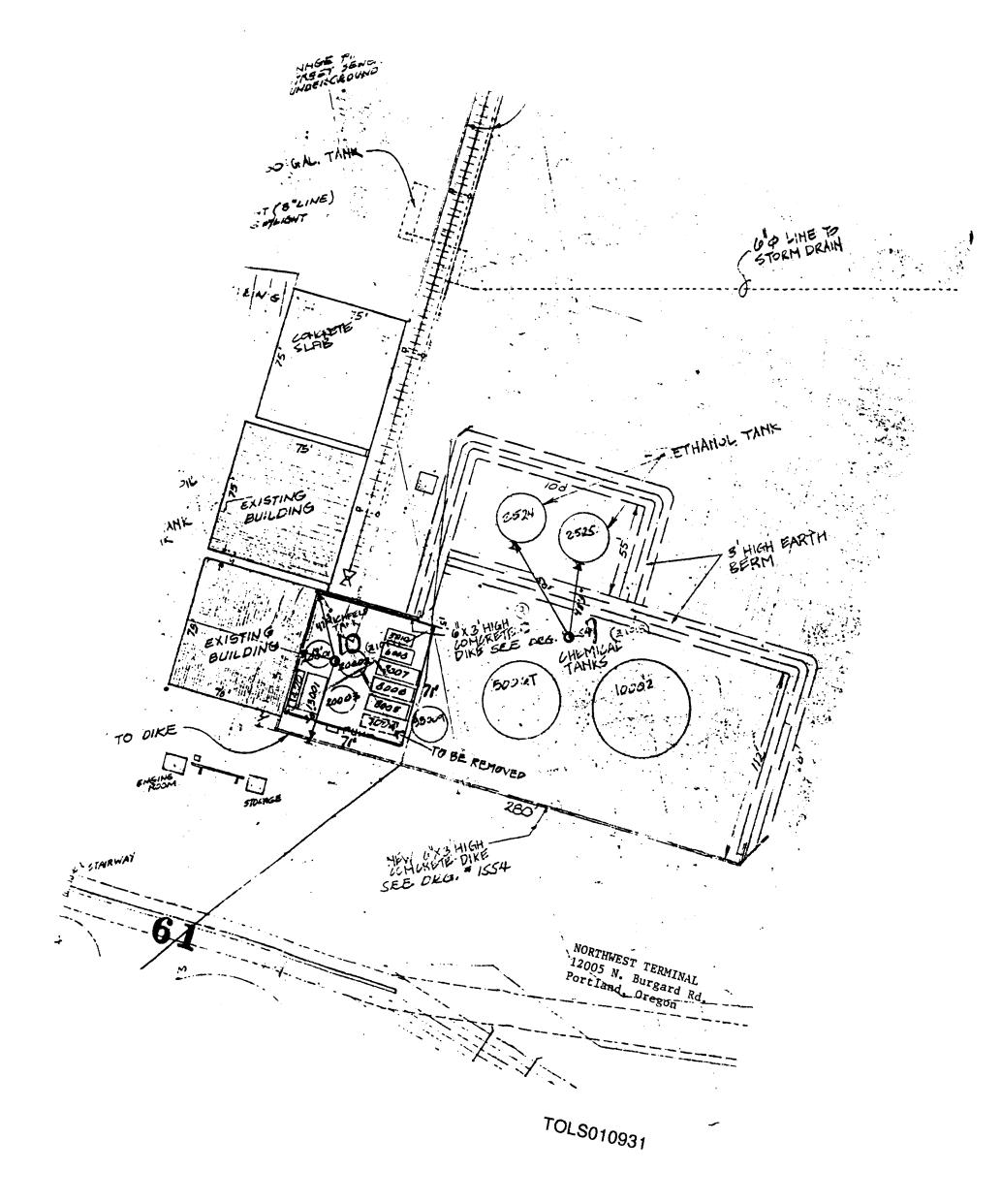
General Manager

John P. Denham

Environmental Manager

John H. Somes

61



#### EXHIBIT A

85-001 SUPPLEMENTAL INFORMATION DOCUMENT: NUMBER

This Document supplements, and is part of, that certain "Waste Transportation and Disposal Agreement," (hereinafter "the Agreement"), entered into by and between <u>Time Oil Company</u>, (hereinafter "the Generator"), and CHEM SECURITY SYSTEMS, INC. (hereinafter "Disposer"), on May 24, 1985. this Document shall be incorporated into the Agreement. \_\_\_\_, 1985. The provisions of

DESCRIPTION OF WASTE PRODUCTS. The "Waste Products", to which the Agreement refers, are described in the "Generator's Waste Material Profile Sheet," Code Designation E13588 attached hereto and made part hereof.

Containers are to be provided by Generator according to the following specifications: lined and plastic wrapped dump truck

- 2. TENDER OF WASTE PRODUCTS. Generator shall tender or deliver the above Waste Products to Disposer as follows:
  - (a) Quantity of Waste Products to be Tendered Over Term.
    - (1) Estimated.

Volume listed in Section "F" of referenced Generator's Waste Material Profile Sheet(s) or in addenda for each profile sheet.
(2) Guaranteed (if applicable).

Not Applicable.

(b) Maximum/Minimum Quantity of Waste Products Per Tender (if tendered in installments).

Maximum: same as quantity listed in Section 2(a) above. or in addendum to waste profile sheet.

- (c) Place of Tender. Arlington, Oregon
- (d) Time and Frequency of Tender. 8:00 a.m. to 4:30 p.m. weekdays, except holidays, weather permitting.

c 1984, WASTE MANAGEMENT, INC. (Revised 10/10/84)

- (e) Manner of Tender (including notification to Disposer).
  Uniform hazardous waste manifest. No free liquid may be present in waste.
- 3. WORK RULES/PROCEDURES AT GENERATOR'S PREMISES. Any specific rules or procedures required by Generator for workers on its premises must be noted here, or attached hereto and initialed by both parties.
- 4. LOADING AND TRANSPORTATION. The Waste Products are to be loaded (or stowed) on vehicles (or vessels) by Generator, and transported to the Storage Facility/Disposal Facility (circle one) by Generator

  If the Waste Products are first transported to a Storage Facility, they will be reloaded (or stowed) on vehicles (or vessels) by N/A, and transported to the Disposal Facility by N/A. If Disposer is to provide transportation the following special transportation requirements (if any) shall apply, pursuant to the Generator's direction:
  - (a) <u>Vehicles or Vessels</u>.

    dump truck
  - (b) Routes.
    Not Applicable.
  - (c) Hours of Transportation.
    Not Applicable.
- 5. STORAGE FACILITY. Disposer shall store the Waste Products at the following storage facility for a period not to exceed days, from which facility the Waste Products will then be removed to the Disposal Facility: Not Applicable

- (a) Name/Address of Storage Facility:
- (b) Name/Address of Facility Permittee:
- (c) Permit Number(s)/Initiation and Termination Date(s):
- (d) Permitting Authority(ies):
- 6. DISPOSAL FACILITY. Disposer shall dispose of the above Waste Products at the following disposal facility (or facilities):
  - (a) Name/Address of Facility (Facilities):

The Arlington Facility
Star Route
Arlington, Oregon 97812

(b) Name/Address of Facility Permittee:

Chem-Security Systems, Inc. P.O. Box 1866 Bellevue, Washington 98009-1866

(c) Permit Number(s)/Initiation and Termination Date(s):

State of Oregon - HW-1, initiated Aug. 26, 1980; continues pending issuance of new permit.

(d) Permitting Authority(ies):

Oregon Department of Environmental Quality.

- 7. DISPOSAL METHODS: Disposer shall utilize one or more of the following methods for the disposal of the Waste Products:

  secure burial
- 8. EMERGENCY SERVICES: Disposer shall provide emergency transportation, storage or disposal services, with respect to the above Waste Products, pursuant to the following:

As required by site license or at Generator's request

9. RECLAMATION AND/OR SALE OF WASTE PRODUCTS. Disposer is authorized to reclaim, recover and sell, distribute or use the Waste Products, their components or residues, except as specified below:

Not Applicable.

- 10. <u>COMPENSATION</u>. The Generator shall compensate Disposer as follows:
  - (\*) For Transportation, Storage and Disposal of Waste Products.
  - (b) For \*\*\*Manaspane\*\*\* | For \*\*\* For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | For \*\*\* | F

Fed. tax is \$213 per dry wt. ton. Minimum billing is \$200 per tender. (c) For Disposal of Waste Products Only.

(d) Emergency Services.

Time and mateirals basis

(e) Measurement of Waste Products. Waste Products shall be measured by Disposer for the purpose of computing fees here-under, at the time and place, and in the manner, as follows: Upon acceptance at the Arlington facility using:

facility scale

TOLS010935

(Revised 10/10/84)

		(f)	1:		ompany irgard Ro	ad	Disposer	shall	submit	its
		(g)	from the	Billing A following JRITY SYST	<b> :</b>		oser wil	l issue	its bil	lings
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	Infor	matic that	signatures on Documen certain d above.	nt shall	be consid	iered	an atta	chment	to, and	part
	Date:			Time Oil Company						
					By:					
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(Rev	ised ]	0/10/	<b>/84)</b>							

#### EXHIBIT B

#### **AUTHORIZED SIGNATORIES**

This Exhibit, being attached to, and forming part of that certain "Waste Transportation and Disposal Agreement" entered into by the undersigned parties on  $\frac{\text{May }24,\ 1985}{\text{ }}$ , establishes the identities of those persons authorized to execute Supplemental Information Documents on behalf of the parties, to-wit:

#### FOR GENERATOR:

### FOR DISPOSER:

 $\{g_{ij}\}_{i=1}^{n}$ 

Regional Sales Manager up to \$ 50,000

District Manager or National Accounts Manager up to \$ 300,000

Regional Vice President or Regional Manager up to \$ 500,000

Senior Vice President up to \$1,000,000

President over \$1,000,000

Time Oil Company
Ву:
Title:
Chem-Security Systems, Inc.
Ву:
Title:

(Revised 10/10/84)

#### MEMORANDUM

July 8, 1985

TO:

Neil Wallis

**Portland** 

FROM:

John Denham

Seattle

SUBJECT: CONTRACT WITH CHEM-SECURITY SYSTEMS, INC.

Attached is copy of fully executed contract. This is a replacement for subject contract which you now have on file but is unsigned by the Chem-Securities district manager. Kindly remove and destroy the copy you have in your file, substituting the enclosed therefor.

Attachment a/s

JPD/ch



# CHEM-SECURITY SYSTEMS, INC.

P.O. Box 1269 • Portland, Oregon 97207-1269 • (503) 223-1912

July 5, 1985

John Denham
Time Oil Company
2737 N. Commodore Way
Seattle, Washington 98199

Dear Mr. Denham:

Enclosed is your fully-executed contract copy. We appreciate your business and look forward to serving your hazardous waste needs in the coming years.

Sincerely,

CHEM-SECURITY SYSTEMS, INC.

Joyce Johnson

Inside Sales Representative

JJ:1h Enclosure

#### WASTE TRANSPORTATION AND DISPOSAL AGREEMENT

On this 24th day of May 19 84, the parties, Time Oil Co.

| a Washington | corporation with its principal offices at 2737 W. Commodore Way, Seattle, WA 98199 (hereinafter called "Generator"), and CHEM-SECURITY SYSTEMS, INC., a Washington corporation with its principal offices at 10602 N. E. 38th Place, Kirkland, Washington 98033 (hereinafter called "Disposer"), have agreed as follows:

1. WASTE PRODUCTS. The term "Waste Products" refers to those solid, liquid, semi-solid, or contained gaseous materials which are generally described in, and which have physical, chemical, biological or radioactive constituents, characteristics and properties within the specifications stated in, the Supplemental Information Document. The term "Waste Products" also includes containers described in the Supplemental Information Document, if they are to be supplied by the Generator. The term "unit of Waste Products" refers to a single whole container of Waste Products (such as a barrel, drum, box, or tanker load).

Materials and containers shall be considered nonconforming:
(i) if they are not in accordance with the warranties,
descriptions, specifications or limitations stated in this
agreement and the Supplemental Information Document, or (ii)
if they have material constituents or components, not
specifically identified in the Supplemental Information
Document, (a) which materially increase the nature or extent
of the hazard and risk undertaken by CSSI in agreeing to
handle, load, transport, store, treat or dispose of the Waste
Products, or (b) for whose storage, treatment or disposal the
Disposal Facility is not designed or permitted.

2. SUPPLEMENTAL INFORMATION DOCUMENT. Where "the Supplemental Information Document" is referred to in this Agreement, the parties understand that such term refers to each single entire document, in that form specified in Exhibit A, (which exhibit is attached hereto and made part hereof), containing the information therein required and executed by the Generator and Disposer. Each Supplemental Information Document shall be numbered in chronological sequence. A Supplemental Information Document, prepared and executed as herein required, shall be considered incorporated into this Agreement and part hereof as of the date and time of Document execution. It is the intention of the parties that each Supplemental Information Document, when incorporated into this Agreement, constitutes a separate undertaking, individually enforceable.

Form No. WMI-55-B (Rev. 10/10/84) c 1980, WASTE MANAGEMENT, INC.

33

A Supplemental Information Document, or any amendment thereto, shall be executed, on behalf of Disposer or Generator, only by such persons appointed as authorized agents of the parties for such purposes, which persons are identified, by name or specific position title, in Exhibit B. attached hereto and made part hereof. Either party may, by notice to the other, amend its list of authorized agents, which shall constitute an amendment to Exhibit B at the time such notice is received.

:35

At any time during the term of a Supplemental Information Document, upon the written request of Disposer, the Generator shall: (a) supply an updated written description of the Waste Products or a written certification that the description previously supplied remains true and accurate; or, (b) supply a written certification that a particular load of Waste Products delivered to Disposer constituted a representative sample of the Waste Products described in the Supplemental Information Document; or, (c) supply a representative sample of the Waste Products together with a written certification of the sample's representativeness; or, (d) allow Disposer access to the Waste Products at Generator's facility for the purpose of obtaining one or more representative samples. Forms to be used in providing written Waste Products descriptions, recertifications of previous descriptions, or certifications of representative Waste Products samples shall be supplied by Disposer.

3. TENDER OF DELIVERY. Generator shall tender delivery of the Waste Products to Disposer at those times and places, in those quantities, and in the manner specified in the Supplemental Information Document. Generator shall, at the same time and place, tender to Disposer those completed documents, shipping papers or manifests as are required, for lawful transfer of the Waste Products to Disposer, by valid and applicable statutes, ordinances, orders, rules or regulations of the federal, state, or local governments, including, but not limited to, the Hazardous Materials Transportation Act, the Toxic Substances Control Act and the Resource Conservation and Recovery Act of 1976.

Tender of delivery shall be considered non-conforming if not in accordance with this Section and the specifications of the Supplemental Information Document, or if not preceded by such notification as required by Section 16 (f).

4. DISPOSER RIGHT TO INSPECTION UPON TENDER. Disposer shall have the right, but not the obligation, to inspect, sample, analyze, or test any tendered Waste Products before accepting such products. Failure or refusal of the Generator to provide Disposer with access to any tendered or delivered Waste Products, prior to Disposer's acceptance, shall be deemed a non-conforming tender or delivery of all of the Waste Products tendered or delivered at that time and place. Disposer's

exercise of, or failure to exercise, its right hereunder shall not operate to relieve Generator of its responsibility or liability under this Agreement.

DISPOSER RIGHTS ON IMPROPER DELIVERY. If the Waste Products, any unit thereof, or the tender of delivery fail in any respect to conform to this Agreement, including the requirements of the Supplemental Information Document, Disposer may, at its exclusive option, (i) reject all Waste Products tendered; or, (ii) accept all Waste Products tendered; or, (iii) accept any unit or units of Waste Products and reject the rest. Provided, however, if a particular unit of Waste Products is determined to be non-conforming solely because of a patent non-conformity in the container, its labeling or marking, which non-conformity, if present in any other tendered container, would be visibly apparent, Disposer's option shall be limited to accepting or rejecting the particular non-conforming unit.

Rejection of the Waste Products must be within a reasonable time after their tender or delivery, not to exceed twenty-four (24) hours. In rejecting any Waste Products, Disposer shall orally notify the Generator of the manner in which the Waste Products or the tender of delivery are non-conforming, such notice to be followed by written notice within five (5) business days.

6. ACCEPTANCE OF WASTE PRODUCTS. Disposer shall accept any Waste Products which are in conformance with, and which have been tendered in conformance with, this Agreement, including the Supplemental Information Document, and may accept, as provided in Section 5, non-conforming Waste Products. If transportation is to be provided by Disposer, Disposer shall evidence its acceptance by removing such Waste Products from the place of tender. If transportation to the Storage or Disposal Facility is to be provided by Generator, Disposer shall evidence its acceptance by written notice to the Generator, such as through signing shipping papers or the manifest tendered with the Waste Products.

Failure of Disposer to reject the Waste Products, or any unit thereof, as provided in Section 5 shall be deemed acceptance of all tendered Waste Products not so rejected.

Upon acceptance of the Waste Products Disposer shall be precluded from rejecting those Waste Products accepted and, if acceptance of any unit of Waste Products was made with actual knowledge of a non-conformity, Disposer shall be precluded from revoking its acceptance of such unit because of such non-conformity. Acceptance of the Waste Products, or any unit thereof, does not, however, impair, or operate as a waiver of, any right or remedy available to Disposer, including revocation of acceptance, in the event the Waste Products or

their tender are later discovered to be non-conforming.

7. REVOCATION OF ACCEPTANCE. Disposer may, at any time before the condition of the Waste Products has been materially changed (such as by treatment, processing or disposal), revoke its acceptance of any unit or units of Waste Products discovered to be non-conforming.

Discovery by Disposer that any unit of the Waste Products is non-conforming for any reason shall be considered discovery that all units of such Waste Products, accepted at the same time as the non-conforming unit, are non-conforming for the same reasons. Provided, if a particular unit of Waste Products is determined to be non-conforming solely because of a patent non-conformity in the container, its labeling or marking, which non-conformity, if present in any other accepted container, would be visibly apparent, Disposer's option shall be limited to revoking acceptance of the particular non-conforming unit.

Revocation must occur within a reasonable time after Disposer actually discovers or should have discovered the non-conformity. In revoking its acceptance of any Waste Products, Disposer shall notify the Generator of the manner in which the Waste Products are non-conforming.

7a GENERATOR'S OPTIONS IN EVENT OF REJECTION OF REVOCATION OF ACCEPTANCE.

In the event Disposer rejects or revokes its acceptance of Waste Products, and at such time the Waste Products are in Disposer's possession or control, Generator may, within five (5) business days after receipt of notice, notify Disposer of Generator's intent to test the Waste Products, to verify the alleged non-conformity, or to correct any improper containerization, marking or labeling. Generator may, if lawfully permitted, direct Disposer to arrange for such testing or corrections, pursuant to Generator's instructions and at Generator's cost. All testing or corrections must be completed within twenty-one (21) days of Generator's receipt of the rejection or revocation notice. During the period of any testing or corrections, the duty of Disposer with respect to the Waste Products shall be that of a bailee for hire.

Upon mutual agreement of the parties that the Waste Products or any unit are not conforming for the reasons specified in Disposer's notice, the notice of rejection or revocation as to such Waste Products or unit shall be deemed null and void as of the time of its original issuance.

8. DISPOSER OPTIONS AS TO RIGHTFULLY REJECTED OR REVOKED WASTE PRODUCTS.

If Disposer rejects or revokes its acceptance of all or any units of Waste Products, and at such time the Waste Products

are in Disposer's possession or control, Disposer and Generator shall, in good faith, attempt to amend the Supplemental Information Document to provide for handling of the non-conforming materials. If the parties cannot, within a reasonable time after rejection or revocation (including any time provided for correction or testing in Section 7a), agree on necessary amendments, Generator shall make prompt arrangements for the removal of the non-conforming materials from the Storage or Disposal Facility to another lawful place of disposition.

Generator agrees to pay Disposer its reasonable expenses and charges for handling, loading, stowing, preparing for transport, transporting, storing and caring for any Waste Products returned to Generator pursuant to this Section.

- 9. LOADING AND TRANSPORTATION OF WASTE PRODUCTS. If the Supplemental Information Document specifies that Disposer is to provide loading or transportation services, Disposer shall load or stow and transport Waste Products to the Storage or Disposal Facility herein specified. In the aforesaid event, as between the parties, selection of transportation vehicles or vessels, times of travel and routes shall be solely determined by Disposer unless otherwise specified in the Supplemental Information Document. In selecting transportation vehicles or vessels compatible with the Waste Products, Disposer shall rely on Generator's description of the Waste Products.
- 10. STORAGE AND DISPOSAL. Disposer shall dispose of the Waste Products at the particular facility or facilities, referred to herein as "the Disposal Facility", identified in the Supplemental Information Document. Disposer shall utilize those general storage, treatment, and disposal methods specified in the Supplemental Information Document; however, as between the parties, Disposer shall be solely responsible for determining the specific times and techniques for storage, processing, treatment and disposal of the Waste Products. In determining such techniques, Disposer shall rely on Generator's description of the Waste Products.

If the Supplemental Information Document specifies that Disposer is to provide interim storage of the Waste Products at a "Storage Facility", prior to transportation of the Waste Products to the Disposal Facility, Disposer shall store such Waste Products at such Storage Facility for a period not to exceed ninety (90) days, unless some other period is specified in the Supplemental Information Document.

Disposer may use, distribute or sell any of the Waste Products, or any component or residue thereof, unless otherwise specified in the Supplemental Information Document.

11. TITLE TO WASTE PRODUCTS. At the time Disposer accepts the Waste Products and takes possession and control thereover, title, risk of loss and all other incidents of ownership to the Waste Products shall be transferred from the Generator and vested in Disposer.

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A justified revocation of acceptance by Disposer revests title to the Generator, including risk of loss and all other incidents of ownership, at the time such revocation of acceptance is communicated to the Generator.

- 12. TERM. The term of this Agreement shall be as specified in the Supplemental Informtion Document, to commence on the date of execution of such Document, as provided in Section 2.
- 13. RIGHT TO TERMINATE. Either party may terminate this Agreement if the other party (i) has been adjudicated a bankrupt, or (ii) has filed a voluntary petition in bankruptcy, or (iii) has made an assignment for the benefit of creditors, or (iv) a receiver has been appointed for such party. Termination pursuant to this paragraph shall be effective for performance remaining under any and all Supplemental Information Documents.

The Generator may terminate this Agreement, with respect to performance remaining under an identified Supplemental Information Document, if, at any time after execution of such document, the specified Storge or Disposal Facility fails to obtain, or maintain as valid, any license, permit or approval required to allow lawful acceptance and storage, treatment, processing and disposal of the Waste Products at such Facility.

Termination as provided above, or as allowed by Section 22, shall be by notice from the terminating party to the other party, specifying the reason therefor and the effective date thereof, which shall be not less than five (5) days after the date of the notice.

Either party may terminate this Agreement without cause, with respect to performance remaining under an identified Supplemental Information Document, by notice from the terminating party to the other party specifying the effective date of termination which shall be not less than thirty (30) days after receipt of the notice by the non-terminating party.

The right of terminating hereunder is in addition to, and not in lieu of, any right of a party to cancel this Agreement for breach of its terms or conditions.

14. COMPENSATION. For all of the Waste Products transported, stored and disposed of by Disposer, the Generator shall pay Disposer a fee, determined in accordance with the Supplemental Information Document. Disposer shall measure the Waste Products, for the purpose of computing fees, at the time and

place, and in the manner, specified in the Supplemental Information Document. Disposer determinations so made shall govern unless proved to be in error by Generator.

Fees specified in the Supplemental Information Document shall not be altered during the term of this Agreement except as follows:

- (a) Disposer may, on the first day of any calendar quarter, with thirty (30) days written notice to Generator, increase or decrease fees specified in the Supplemental Information Document. If any Waste Products, to which such fee alterations apply, are delivered to Disposer more than thirty days after Generator's receipt of this notice, Generator shall be deemed to have accepted such fee alterations and the Supplemental Information Document shall be deemed amended in such respect.
- (b) If legislation or regulations, first implemented after date of execution of the Supplemental Information Document, impose taxes, tariffs, fees, surcharges or other charges upon the transportation, storage, processing, treatment or disposal of the Waste Products, the Generator shall reimburse the Disposer for such charges upon the Disposer's submission of an invoice stating that such charges have been levied or paid.

The Disposer shall submit statements to the Generator which shall be paid by the Generator not later than thirty (30) days from date of receipt. Disposer shall retain copies of such statements for a period of at least five (5) years as a record of disposal.

- 15. DISPOSER WARRANTIES. Disposer warrants and represents to the Generator that:
  - (a) Disposer understands the currently known hazards and risks which are presented to human beings, property and the environment in the handling, transportation, storage, treatment, processing and disposal of the Waste Products as they have been described by the Generator in the Supplemental Information Document; and,
  - (b) Disposer is engaged in the business of transportation, storage and disposal of industrial and other wastes, and has developed the requisite expertise for the handling, transportation, storage, treatment, processing, and diposal of such; and,
  - (c) Disposer will handle, load, stow, transport, store, treat, process, and dispose of the Waste Products in a safe and workmanlike manner and in full compliance with all valid and applicable statutes, ordinances, orders,

rules and regulations of the federal, state and local governments in whose jursidictions such activities are performed under this Agreement; and,

(d) Any and all vehicles or vessels, Waste Products containers and personnel to be provided by Disposer in the performance of this Agreement have obtained or will obtain all permits, licenses, certificates or approvals required to comply with valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments.

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- Storage or Disposal Facility (or Facilities) described in the Supplemental Information Document has been issued, as of the date of execution of such Document, all permits, licenses. certificates approvals, required by valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments in which such Facility is located, necessary to allow such Facility to accept and store, treat, process and dispose of the Waste Products as described by the Generator in such Document. Disposer shall provide Generator with reasonable advance notice if any such permit, license, certificate or approval is to expire and not be renewed during the term of a Supplemental Information Document, or becomes the subject of judicial or administrative action seeking revocation or suspension. Such notice shall also be provided if Disposer determines not to seek any necessary permit, license, certificate or approval which becomes required after execution of a Supplemental Information Document.
- 16. GENERATOR WARRANTIES. The Generator warrants and represents to Disposer that:
  - The description of the Waste Products in the Supplemental Information Document is true and correct in all material respects, fairly advises Disposer of the hazards and risks known by the Generator to be incident to the handling, transportation, storage, treatment, processing and disposal of the Waste Products, and is otherwise in with all materials description full compliance requirements of valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments in whose jurisdictions such Waste Products are to be handled, transported, stored, treated, processed or disposed; and,
  - (b) Waste Products tendered to Disposer will conform to the descriptions and specifications contained in the Supplemental Information Document; and,

- (c) If Generator receives information, during the term of any Supplemental Information Document, that Waste Products described in such Document, or some component of such Products, present or may present a hazard or risk to persons or the environment, which was not disclosed in the Supplemental Information Document, Generator shall promptly report such information to Disposer. Such information shall include, but not be limited to, any relevant notification of substantial risk required to be given by Generator pursuant to Section 8 (e) of the Toxic Substances Control Act;
- (d) If any load of Waste Products, tendered to Disposer for transportation in a single transportation vehicle, contains a reportable quantity of one or more hazardous substances, as provided in Section 102 of the Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, or regulations adopted thereunder, Generator will, prior to tendering such load to Disposer, provide the person in charge of the Disposer transport vehicle with written notice that the load contains a reportable quantity of such hazardous substance(s), identifying the known or estimated quantity of each such hazardous substance present.
- (e) Generator will prepare the Waste Products for transportation and tender to Disposer in accordance with all valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments in whose jurisdiction such Waste Products are to be tendered to Disposer pertaining to: (i) container specifications for any container not supplied by Disposer; and, (ii) marking and labeling of all containers.
- (f) If regulations promulgated or revised under Section 3001 of the Resource Conservation and Recovery Act of 1976 (P. L. 94-580) identify the Waste Products as "hazardous waste," either by characteristics or listing, the Generator, prior to tendering any Waste Products to Disposer has filed or will file with the appropriate governmental agency the preliminary notification required by Section 3010(a) of the above Act, and provide Disposer with evidence thereof.
- (g) The Generator has sole title to Waste Products which will be tendered to Disposer, and is under no legal restraint, statutory, regulatory, administrative or judicial, which prohibits the transfer of possession or title to such Waste Products to Disposer.
- 17. INDEMNIFICATION. Disposer agrees to indemnify and save harmless the Generator, its present and future officers or

directors (or officials), employees and agents, from and all liabilities, penalties, fines, against any and forfeitures, demands, claims, causes of action, suits, and costs and expenses incidental thereto, (including cost of defense, settlement, and reasonable attorney's fees), which any or all of them may hereafter suffer, incur, be responsible for or pay out as a result of bodily injuries (including death) to any person, damage (including loss of use) to any property (public or private), contamination of or adverse effects on the environment, or any violation or alleged violation of statutes, ordinances, orders, rules regulations of any governmental entity or agency, directly or indirectly caused by, or arising out of breach of any warranties by Disposer, or any negligent or willful act or omission of Disposer, its employees or subcontractors in the performance of this Agreement.

The Generator agrees to indemnify and save harmless Disposer, its present and future officers, directors, employees, agents, subcontractors and assignees, from and against any and all liabilities, penalties, fines, forfeitures, demands, claims, causes of action, suits, and costs and expenses incidental thereto, (including cost of defense, settlement, and reasonable attorney's fees), which any or all of them may hereafter suffer, incur, be responsible for or pay out as a result of bodily injuries (including death) to any person, damage (including loss of use) to any property (public or private), contamination of or adverse effects on the environment, or any violation or alleged violation of statutes, ordinances, orders, rules or regulations of any governmental entity or agency, directly or indirectly caused by, or arising out of breach of any warranties by the Generator, or any negligent or willful act or omission of Generator, its employees or agents in the performance of this Agreement.

18. INSURANCE. Disposer shall procure and maintain, at its expense, during the term of this Agreement, at least the following insurance:

	COVERAGE	LIMITS
(a)	Worker's Compensation	Statutory
(b)	Employer's Liability	\$500,000 each occurence
(c)	Public Liability (bodily injury & property damage)	\$15,000,000 combined single limit
(d)	Automobile Liability (bodily injury & property damage)	\$15,000,000 combined single limit

Public Liability Insurance shall include coverage for completed operations and contractual liability under this Agreement with respect to sudden and accidental occurrences.

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Each contract of insurance, and certificate of insurance, shall provide that said insurance shall not be cancelled or materially altered until at least ten (10) days after written notice is received by the Generator. Disposer agrees to furnish insurance with the above requirements, to the Generator before Disposer commences work hereunder.

In the event Disposer is required by law to obtain environmental impairment liability insurance for non-sudden and accidental occurrences at the Disposal Facility, Disposer shall furnish Generator with a copy of the certificate of insurance provided to the regulatory agency imposing the insurance requirement.

19. CONFIDENTIALITY. Disposer and Generator shall treat as confidential property and not disclose to others during or subsequent to the term of this Agreement, except as is necessary to perform this Agreement, (and then only on a confidential basis satisfactory to both parties), any information (including any technical information, experience or data) regarding either party's plans, programs, plants, processes, products, costs, equipment, operations or customers which may come within the knowledge of the parties, their officers or their employees in the performance of this Agreement, without in each instance securing the prior written consent of the other party.

Disposer shall also treat as confidential and shall not disclose to others, except as required by law, information relating to the chemical composition of the Waste Products or the quantity of Waste Products delivered to it by Generator.

Generator shall also treat as confidential and shall not disclose to others, except as required by law, this form of Agreement and the Supplemental Information Document.

Nothing above, however, shall prevent either Disposer or Generator from disclosing to others or using in any manner information which either party can show:

- (a) Has been published and has become part of the public domain other than by acts, omissions or fault of Disposer or Generator or their employees; or
- (b) Has been furnished or made known to Disposer or Generator by third parties (other than those acting directly or indirectly for or on behalf of Disposer or

Generator) as a matter of legal right without restrictions on its disclosure; or

(c) Was in either party's possession prior to the disclosure thereof by Generator or Disposer to each other.

Provided, however, neither party shall release, or cause or allow the release of, information to the communications media, except as required by law, concerning the existence or terms of this Agreement or any Supplemental Information Document, including identification of the Generator of the Waste Products, identification of the Disposal Facility receiving the Waste Products, or the general description, characteristics or constituents of the Waste Products, without in each instance securing the prior written consent of the other party.

The foregoing obligations shall survive the termination or expiration of the Agreement.

- 20. WORK ON GENERATOR'S PREMISES. Generator agrees to provide Disposer, its employees and subcontractors a safe working environment for any work, in performance of this Agreement, which must be undertaken on premises owned or controlled by the Generator. While its employees or subcontractors are on Generator's premises, Disposer will maintain strict work discipline and effect its work in compliance with governmental laws or regulations pertaining to occupational safety and health. Disposer, its employees and subcontractors shall also comply with the Generator's safety procedures while on the Generator's premises, provided such procedures have been specified in the Supplemental Information Document or are attached thereto.
- 21. INSPECTIONS. The Generator shall have the right to inspect and obtain, at its expense, copies of all written licenses, permits or approvals, issued by any governmental entity or agency to Disposer or its subcontractors which are applicable to the performance of this Agreement and for which no claim of business confidentiality or trade secret is asserted; to inspect and test, at its own expense, transportation vehicles or vessels, containers or disposal facilities provided by Disposer; and to inspect the handling, loading, transportation, storage, treatment, processing or disposal operations conducted by Disposer in the performance of this Agreement. Such inspections are encouraged by Disposer, but shall not operate to relieve Disposer of its responsibility or liability under this Agreement.
- 22. EXCUSE OF PERFORMANCE. The performance of this Agreement, except for the payment of money for services already rendered, may be suspended by either party in the event the delivery or

Products transportation of Waste bγ Generator. transportation, storage, treatment, processing or disposal of Waste Products by Disposer are prevented by a cause or causes beyond the reasonable control of such party. Such causes shall include, but not be limited to, acts of God, acts of war, riot, fire, explosion, accident, flood, or sabotage; lack fuel, power, raw adequate materials, transportation facilities; governmental laws, regulations, requirements, orders or actions; breakage or failure of machinery or apparatus; national defense requirements; machinery or apparatus; national defense requirements; injunctions or restraining orders; labor trouble, strike, lockout or injunction (provided that neither party shall be required to settle a labor dispute against its own best judgement).

The party asserting a right to suspend performance under this Section must, within a reasonable time after he has knowledge of the effective cause, notify the other party of the cause for suspension, the performance suspended, and the anticipated duration of suspension. Upon receipt of such notice advising of a material or indefinite suspension of performance, and if such suspension substantially impairs the value of this Agreement to him, a party may, within a reasonable time (not to exceed thirty days), terminate this Agreement as provided in Section 13. If such notice of termination is not provided, this Agreement will lapse with respect to any performance suspended hereunder.

The party asserting a right to suspend performance hereunder shall advise the other party when the suspending event has ended, and when performance will be resumed.

Provided, if title to Waste Products has been transferred to Disposer, Disposer may not suspend performance of this Agreement with respect to such Waste Products; however, if a performance-suspending event occurs after Disposer has taken title to Waste Products but before completion of performance, Disposer may delegate such performance to any other persons lawfully permitted to transport, store, treat or dispose of the Waste Products pursuant to Section 23. In the circumstances described above, the Generator hereby consents to any necessary delegations for which it receives written notice from Disposer.

23. DELEGATION AND ASSIGNMENT. Disposer may at any time, with the prior written consent of Generator, which consent shall not be unreasonably withheld, delegate, orally or in writing, the performance of the work, or any portion thereof, which is by this Agreement undertaken by Disposer. Any such delegation shall not operate to relieve Disposer of its responsibilities hereunder and, notwithstanding any such delegation, Disposer shall remain obligated to the Generator in these undertakings.

Either party may, at any time, upon written notice to the other party, assign its rights under this Agreement.

- 24. INDEPENDENT CONTRACTOR. Disposer is and shall perform this Agreement as an independent contractor, and as such, shall have and maintain complete control over all of its employees, agents, and operations. Neither Disposer nor anyone employed by it shall be, represent, act, purport to act or be deemed to be the agent, representative, employee or servant of the Generator.
- 25. NOTICE. Any notice, communication or statement required or permitted to be given hereunder shall be in writing and deemed to have been sufficiently given when delivered in person or by registered or certified mail, postage prepaid, return receipt requested, to the address of the respective party below:

GENERATOR: Time Oil Company

12005 N. Burgard Road Portland, Oregon 97203

DISPOSER:

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CHEM-SECURITY SYSTEMS, INC.

P.O. Box 1269

Portland, Oregon 97207-1269

Either party may, by notice to the other, change the addresses and names above given.

26. ENTIRE AGREEMENT. This Agreement represents the entire understanding and agreement between the parties hereto relating to the transportation, storage, treatment, processing and disposal of Waste Products and supersedes any and all prior agreements, whether written or oral, that may exist between the parties regarding same. No terms, conditions, prior course of dealings, course of performance, usage of trade, understandings, purchase orders, or agreement purporting to modify, vary, supplement or explain any provision of this Agreement shall be effective unless in writing, signed by representatives of both parties authorized to amend this Agreement.

In no event shall the preprinted terms or conditions found on any Disposer or Generator purchase or work order be considered an amendment or modification of this Agreement, even if such documents are signed by representatives of both parties: such preprinted terms or conditions shall be considered null and of no effect.

- 27. WAIVER. Any waiver by either party of any provision or condition of this Agreement shall not be construed or deemed to be a waiver of any other provision or condition of this Agreement, nor a waiver of a subsequent breach of the same provision or condition, unless such waiver be so expressed in writing and signed by the party to be bound.
- 28. MISCELLANEOUS. The validity, interpretation and performance of this Agreement shall be governed and construed in accordance with the laws of the State specified in the Supplemental Information Document.

All paragraph headings herein are for convenience only and are in no way to be construed as part of this Agreement or as a limitation of the scope of the particular sections to which they refer.

In the event of a conflict between the terms or conditions of this Agreement and those of the Supplemental Information Document, the terms and conditions of the Supplimental Information Document shall control.

- SEPARABILITY. If any Section, subsection, sentence or clause of this Agreement shall be adjudged illegal, invalid or unenforceable, such illegality, invalidity or unenforceability shall not affect the legality, validity or enforceability of the Agreement as a whole or of any Section, subsection, sentence or clause hereof not so adjudged.
- The covenants and agreements contained in this Agreement shall apply to, inure to the benefit of and be binding upon the parties hereto and upon their respective heirs, executors, administrators, assigns and successors in interest.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized representatives as of the day and year first above written.

DATE: JUNE 24 1985

Time Oil Company

CHEM-SECURITY SYSTEMS, INC.

160 E. me Roger E. Nelson

Title:

District Manager

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#### EXHIBIT A

SUPPLEMENTAL INFORMATION DOCUMENT: NUMBER 85-001

This Document supplements, and is part of, that certain "Waste Transportation and Disposal Agreement," (hereinafter "the Agreement"), entered into by and between Time Oil Company (hereinafter "the Generator"), and CHEM SECURITY SYSTEMS, INC. (hereinafter "Disposer"), on May  $^{24}$ ,  $^{1985}$ . The provisions of this Document shall be incorporated into the Agreement.

1. <u>DESCRIPTION OF WASTE PRODUCTS</u>. The "Waste Products", to which the Agreement refers, are described in the "Generator's Waste Material Profile Sheet," Code Designation <u>E13588</u>, attached hereto and made part hereof.

Containers are to be provided by Generator according to the following specifications:
lined and plastic wrapped dump truck

- 2. <u>TENDER OF WASTE PRODUCTS</u>. Generator shall tender or deliver the above Waste Products to Disposer as follows:
  - (a) Quantity of Waste Products to be Tendered Over Term.
    - (1) Estimated.

Volume listed in Section "F" of referenced Generator's Waste Material Profile Sheet(s) or in addenda for each profile sheet.

(2) Guaranteed (if applicable).

Not Applicable.

(b) Maximum/Minimum Quantity of Waste Products Per Tender (if tendered in installments).

Maximum: same as quantity listed in Section 2(a) above. or in addendum to waste profile sheet.

- (c) Place of Tender.
  Arlington, Oregon
- (d) Time and Frequency of Tender.
  8:00 a.m. to 4:30 p.m. weekdays, except holidays, weather

permitting.

c 1984, WASTE MANAGEMENT, INC. (Revised 10/10/84)

- (e) Manner of Tender (including notification to Disposer).

  Uniform hazardous waste manifest. No free liquid may be present in waste.
- 3. WORK RULES/PROCEDURES AT GENERATOR'S PREMISES. Any specific rules or procedures required by Generator for workers on its premises must be noted here, or attached hereto and initialed by both parties.
- 4. LOADING AND TRANSPORTATION. The Waste Products are to be loaded (or stowed) on vehicles (or vessels) by Generator, and transported to the Storage Facility Disposal Facility (circle one) by Generator

  If the Waste Products are first transported to a Storage Facility, they will be reloaded (or stowed) on vehicles (or vessels) by N/A, and transported to the Disposal Facility by N/A. If Disposer is to provide transportation the following special transportation requirements (if any) shall apply, pursuant to the Generator's direction:
  - (a) Vehicles or Vesse!s. dump truck
  - (b) Routes.

    Not Applicable.
  - (c) Hours of Transportation.
    Not Applicable.
- 5. STORAGE FACILITY. Disposer shall store the Waste Products at the following storage facility for a period not to exceed days, from which facility the Waste Products will then be removed to the Disposal Facility: Not Applicable

TOLS010956

(Revised 10/10/84)

- (a) Name/Address of Storage Facility:
- (b) Name/Address of Facility Permittee:
- (c) Permit Number(s)/Initiation and Termination Date(s):
- (d) <u>Permitting Authority(ies)</u>:
- 6. <u>DISPOSAL FACILITY</u>. Disposer shall dispose of the above Waste Products at the following disposal facility (or facilities):
  - (a) Name/Address of Facility (Facilities):

The Arlington Facility
Star Route
Arlington, Oregon 97812

(b) Name/Address of Facility Permittee:

Chem-Security Systems, Inc.
P.O. Box 1866
Bellevue, Washington 98009-1866

(c) Permit Number(s)/Initiation and Termination Date(s):

State of Oregon - HW-1, initiated Aug. 26, 1980; continues pending issuance of new permit.

(d) Permitting Authority(ies):

Oregon Department of Environmental Quality.

TOLS010957

(Revised 10/10/84)

- 7. DISPOSAL METHODS: Disposer shall utilize one or more of the following methods for the disposal of the Waste Products:

  secure burial
- 8. EMERGENCY SERVICES: Disposer shall provide emergency transportation, storage or disposal services, with respect to the above Waste Products, pursuant to the following:

As required by site license or at Generator's request

9. RECLAMATION AND/OR SALE OF WASTE PRODUCTS. Disposer is authorized to reclaim, recover and sell, distribute or use the Waste Products, their components or residues, except as specified below:

Not Applicable.

- 10. COMPENSATION. The Generator shall compensate Disposer as follows:
  - (a) Ser transportation, Storage and Disposal of Waste Products.
  - (b) For Examplementation and Disposal of Waste Products. Per ton:

    Before July 1, 1985

    Beginning July 1, 1985

    250 tons per yr. \$110

    \$116

    250-1500 tons per yr. \$100

    \$106

Fed. tax is \$213 per dry wt. ton. Minimum billing is \$200 per tender.

(c) For Disposal of Waste Products Only.

(d) Emergency Services.

Time and mateirals basis

(e) Measurement of Waste Products. Waste Products shall be measured by Disposer for the purpose of computing fees here-under, at the time and place, and in the manner, as follows: Upon acceptance at the Arlington facility using:

facility scale

TOLS010958

(Revised 10/10/84)

(f) Generator's Billing Address. Disposer shall submit its statements to:

> Time Oil Company 12005 N. Burgard Road Portland, Oregon 97203

(g) Disposer Billing Address. Disposer will issue its billings from the following:

CHEM-SECURITY SYSTEMS, INC. STAR ROUTE ARLINGTON, OREGON 97812

TERM. The term of the Agreement, with respect to the Waste 11. Products covered in this Document, shall be as follows:

> This Agreement shall commence on May 24, 1985 shall remain in effect until terminated by either party with or without cause by thirty (30) days' advance written notice to the other party.

- LAW TO GOVERN. The Agreement and this Supplemental Information Document shall be governed and construed in accordance with the laws of the State of Oregon
- 13. MISCELLANEOUS CONDITIONS.

By their signatures hereto, the parties agree that this Supplemental Information Document shall be considered an attachment to, and part of, that certain "Waste Transportation and Disposal Agreement" identified above.

Date: JUNE 24 1985

Time Oil Company

8y:

CHEM-SECURITY SYSTEMS, INC.

Roder E. Nelson

Title: <u>District Manager</u>

(Revised 10/10/84)

### EXHIBIT 8

### **AUTHORIZED SIGNATORIES**

This Exhibit, being attached to, and forming part of that certain "Waste Transportation and Disposal Agreement" entered into by the undersigned parties on  $\frac{\text{May }24,\ 1985}{\text{May }24,\ 1985}$ , establishes the identities of those persons authorized to execute Supplemental Information Documents on behalf of the parties, to-wit:

### FOR GENERATOR:

### FOR DISPOSER:

Regional Sales Manager	up to \$ 50,000
District Manager or National Accounts Manager	up to \$ 300,000
Regional Vice President or Regional Manager	up to \$ 500,000
Senior Vice President	up to \$1,000,000
President	over \$1,000,000

Time Oil Company

By: John F. Denham
Title Environmental Myr

Chem-Security Systems, Inc.

By: Roge E. Me

Title: Disturting.

(Revised 10/10/84)

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		SEPA WASTE CODE
GENERATOR NAME: 178 OL O.		EPA GENERATOR I.D. NUMBER
FACIL	ITY ADDRESS	MAILING ADDRESS
Time Oil Co.		Perro
12005 N. Burgar	97203-6493	
	John P. Denham	Tel. No. 206 285-2400
Review and approval of the subject waste streat description is detailed on the attached waste pr		e Chem-Security Arlington site. The complete waste
DESCRIPTION CHEMICAL COMPOS		PROCESS/OPERATION GENERATING WASTE
	······································	
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WASTE VOLUME REQUESTED FOR DISPOS	NOW NOW	ANNUAL
	. Di (1)	D (D () T (D)
Based on the Waste Characteristics, Chem-Security p	iroposes to Dispose of the Waste	e By (Describe Treatment/Disposal Procedure)
Landfill by Proxide 4.		
No firms laming allowed.		
C.C. CSSI, Arlington, OR C.C. CSSI, Bellevue, WA	SUBMITT	ED BY: J. Craig McKenzie
CSSI, Portland, OR	000,	NAME (PRINT)
Generator	æ	SIGNATURE
	<u>.</u>	4-29-85
500 005004 055	• • • • • • • • • • • • • • • • • • •	DATE
	PARTMENT OF ENVIRONMEN	VIAL QUALITY USE UNLE
THE SUBJECT WASTE STREAM HAS BEEN REV DISPOSAL AT THE ARLINGTON SITE AND IS H		ITS:
State of Oregon	, · , · · · · · · · · · · · ·	
Department of Environmental Quality  APPROVED		
a May 14. 1985		
a fluidato & China		
Solid Waste Division Hazardous Waste Operations		TOLS010961
CSS1-6000 [1/85]	RE: HW4.10	A STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STA

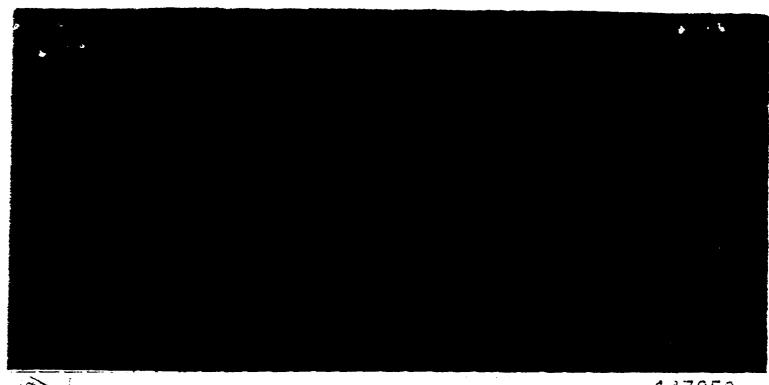
### waste management, Inc. GENERATOR'S WASTE MATERIAL PROFILE SHEET GENERATOR NAME L Time 011 Co. TRANSPORTER Cresham Transfer Inc. TRANSPORTER PHONE: (503) 255-7900 12005 N. Burgard Rd. Portland, OR \_\_\_\_\_ GENERATOR USEPA ID QUE ID 10 19 15 19 17 15 14 13 J GENERATOR STATE I.D L TECHNICAL CONTACT: L. John P. Denham NAME OF WASTE: PCP contaminated soil PROCESS GENERATING WASTE: Clean un of contaminated site at 12005 N. Burgard Road PHYSICAL CHARACTERISTICS OF WASTE COLOR PHYSICAL STATE @ 70°F NONE FREE LIQUIDS MULTILAYERED SOLID SEMI-SOLID YES ₩ NO BI-LAYERED LIQUID POWDER VOLUME L SINGLE PHASED рН: □< 2 7.1-10 1.3-1.4 CLOSED CUP N/A FLASH C 70°F SPECIFIC 2-4 70°F - 100°F 10.1 - 12.5 .8 - 1.0 1.5-1.7 NO FLASH OPEN CUP 4.1 - 6.9 2.5 101°F - 139°F 1.1-1.2 EXACT\_ □> 1.7 140 °F - 200 °F EXACT L EXACT L CHEMICAL COMPOSITION (TOTALS MUST ADD TO 100%) TOTAL (PPM) EPA EXTRACTION PROCEDURE (mg/L) Contaminated soil ARSENIC (As) SELENIUM (Se)L .1820 pentachlorophenol -0-BARIUM (Ba) SILVER (Aa) tetrachlorophenol 0071ع -0-CADMIUM (Cd) COPPER (Cu) L trace amounts of other CHROMIUM (Cr) NICKEL (NI) -0--0chlorinated chemicals less than ... 0001 MERCURY (Hg) Non-contaminated soil 99.812 CHROMIUM-HEX (Cr + 6) L\_\_\_ OTHER COMPONENTS . TOTAL (PPM) -0--0-SULFIDES L PHENOLICS L SHIPPING INFORMATION G HAZARDOUS CHARACTERISTICS REACTIVITY: 🙀 NONE PYROPHORIC SHOCK SENSITIVE D.O.T. HAZARDOUS MATERIAL? TYES □ NO EXPLOSIVE WATER REACTIVE OTHER PROPER SHIPPING NAME LYASTE DENTACH TOTODRENOT MIXTURE OTHER HAZARDOUS CHARACTERISTICS: HAZARO CLASS (ORM-F 1.0. NO. (NA. 2020 1 R.O. (10. 15. MONE RADIOACTIVE ETIOLOGICAL BULK SOLID METHOD OF SHIPMENT: BULK LIQUID OTHERL PESTICIDE MANUFACTURING WASTE DRUM (TYPE/SIZE) L YES USEPA HAZARDOUS WASTE? 1 CUBIC YARDS ANTICIPATED VOLUME: L USEPA HAZARDOUS CODE(S) U242 PER: TONE TIME ☐ MONTH X YES □ NO ☐ WEEK STATE HAZARDOUS WASTE? STATE CODE(S) \_\_\_\_ IT 242 QUARTER $\Box$ . YEAR TOLS010962 SPECIAL HANDLING INFORMATION \_ ADDITIONAL PAGE(S) ATTACHE HEREBY CERTIFY THAT ALL INFORMATION SUBMITTED IN THIS AND ALL ATTACHED DOCUMENTS IS COMPLETE AND ACCURATE, AND THAT ALL KNOWN OR

Environmental Manager

SUSPECTED HAZARDS HAVE BEEN DISCLOSED. AUTHORIZED SIGNATURE

John P. Dinkun

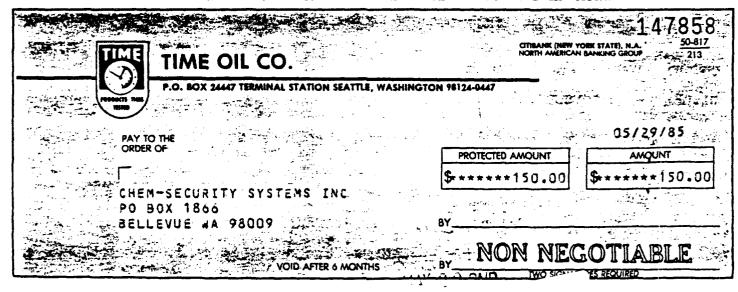
February 19, 1985\_



### OIL CO. 147858

| TIME OIL CO. 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 147858 | 1478

WHEN DETACHED AND PAID, THIS CHECK SECOMES A RECEIPT IN FULL PAYMENT OF THE ITEMIZED ACCOUNT





CHEM-SECURITY SYSTEMS, INC STAR ROUTE ARLINGTON OR 97

ARLINGTON OR 97812 503/454-2643

SERVICE PROVIDED BY: ARLINGTON FACILITY

TIME OIL CO 12005 N BURGARD RD PORTLAND

OR 97203

IIII G FC E

THIS IS AN INVOICE FOR CURRENT CHARGES.
PLEASE PAY AMOUNT INDICATED TELOW
TERMS

NET 30 DAYS AFTER INVOICE DATE

ALL PAST OUE AMOUNTS WILL SEAR INTEREST AT TWO PERCENT PER MONTH OR THE MAXIMUM RATE ALLOWED BY LAW. WHICHEVER IS LESS.

CUSTOMER ACCOUNT NUMBER					
45 <i>0</i>	450	4010	1607		
INVOICE NUMBER	INVOIC	EDATE	PAGE		
1219	04/3	0/85	1		

350506

SERVICE DATE REFERENCE NO./DESC

UNIT

QUANTITY

RATE

AMOUNT

04/26/85 SST0000836-01

LAB FEES

FO# OR CONTRACT# 26859

1.00

PDX-E13588

150.00

SUBTOTAL

150.00 \*

3 i 1219\_ iv 26859

REMIT TO

P. O. BOX 1866 BELLEVUE

WA 98009

PLEASE PAY
THIS AMOUNT

150.00\*\*

HANK YOU FOR YOUR BUSINESS!

**ORIGINAL INVOICE** 

REC' T.O.C. PORTLAND 5/16/85

### CHEM-SECURITY SYSTEMS, INC.

CSSI-6000 (1/85)

### DISPOSAL REQUEST

	REFERENCE: E13588
<b>→</b> •	WASTE PROFILE SHEET NO.
JEJECT:	
WASTE STREAM NAME: PCP continuinated soil	
PHYSICAL STATE	
LIQUID 🗆 SOLID 🔂 SEM	MISOLID D EPA WASTE CODE
GENERATOR NAME: TIME OTT, 30	CRD009597543
GENERATOR NAME: 1105 July 100	EPA GENERATOR I.D. NUMBER
FACILITY ADDRESS	MAILING ADDRESS
Time Oil Co	Same
12005 N. Bargerd 2d.	
Portland, Or	
GENERATOR CONTACT PERSON NAME: John P. Deni	Tel. No. (206 285–2400
description is detailed on the attached waste profile sheet and is s	
DESCRIPTION	PROCESS/OPERATION CENERATING WASTE
CHEMICAL COMPOSITION	GENERATING WASTE
Contaminated soil (pentachlorophenol, tetra other calorinated chemicals) non-contaminated	
200 -	
WASTE VOLUME REQUESTED FOR DISPOSAL:	now Annual
sed on the Waste Characteristics, Chem-Security proposes to Dispos	e of the Waste By (Describe Treatment/Disposal Procedure)
No free liquid allowed	
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CSSI, Arlington, OR	
C CSSI, Bellevue, WA	SUBMITTED BY:J. Craig McKenzie
CSSI, Portland, OR	NAME (PRINT)
Generator	Lare Mile
	SIGNATURE
	4-29-85
	DATE
	ANTIDOMICENTAL OURLITY LICE ONLY "
E SUBJECT WASTE STREAM HAS BEEN REVIEWED FOR	NVIRONMENTAL QUALITY USE ONLY
SPOSAL AT THE ARLINGTON SITE AND IS HEREBY:	COMMENTS:
SPOSAL AT THE ARLINGTON SITE AND IS HEREBY:	
State of Oregon	
Department of Environmental Quality	
State of Oregon	
State of Oregon Department of Environmental Quality	
State of Oregon Department of Environmental Quality  APPROVED On May 14, 1985  By China	
State of Oregon Department of Environmental Quality  APPROVED On May 14 1985  By China Solid Waste Division	
State of Oregon Department of Environmental Quality  APPROVED On May 14, 1985  By China	

### **AGREEMENT**

The parties to this agreement are Time Oil Co. (hereinafter termed Time) and SRH Associates, Inc. (hereinafter termed SRH) whereas:

Time has a  $70^{\circ}$  x  $140^{\circ}$  (approximate) area of land located at 12005 N. Burgard in Portland, Oregon and is desirous of having that area and numerous water wells sampled and analyzed for pentachlorophenol concentration.

SRH is willing to undertake that task upon the terms and conditions set forth below.

The parties agree as follows:

- 1. This agreement covers the following work scope:
  - a. Obtain seventeen (17) surface soil samples for pentachlorophenol analysis. Samples will be collected at points sampled originally by Riedel Environmental Services, Inc. when resulting evaluations showed low, but detectable levels of pentachlorophenol. Samples will be taken following soil relocation by Time. Specific sample locations will be designated by Time.
  - b. Obtain soil samples from six (6) sample locations at five (5) different depths underneath the existing warehouse structure for pentachlorophenol analysis. Samples will be obtained using the split spoon technique. The locations and depths of the samples will be determined by Time.
  - c. Analyze the 47 samples obtained above, for pentachlorophenol, by capillary gas chromatography. Combine these data results with data generated by Riedel during initial investigations and generate plots of equal concentration contours at the depths sampled. Prepare a report including these contours, analytical results and methodologies.
  - d. Sample water wells A, B, D, E, F, H, I plus C and G if possible. Measure static water level, PH and provide laboratory report showing results of analysis for pentachlorophenol.
  - e. Attend a one (1) day meeting at Time Oil Co.'s Seattle, Washington office for the purpose of reviewing Time's files and records concerning the pentachlorophenol contaminated soil issue at the North Portland Terminal. The review will be performed to develop a background report regarding activities performed, time frames and results generated during the entire pentachlorophenol investigation.
  - f. Prepare a report including a synopsis of all Time activities performed at site to date. Evaluate four (4) clean up alternatives for remediation of pentachlorophenol contaminated soil at site. Perform an assessment of the economic and technical feasibility of the alternatives in remediating the site. Alternatives are biodegradation, thermal extraction, in-situ extraction, and incineration. No bench tests, pilot studies or in-depth research will be performed.

- 2. Prior to work under this agreement, a representative of Time will meet with SRH to more specifically delineate items of concern.
- 3. The commencement date for work will be August 19, 1986. Work completion date will be September 4, 1986 or such other date as may be agreed upon by the parties following coordination.
- 4. For this task, Time agrees to pay SRH a sum not to exceed \$17,695.00. Detailed cost breakout is attached. Payment will be made upon completion of work and receipt by Time of written reports.

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- 5. SRH indemnifies and agrees to defend and hold Time harmless from any and all costs, claims, liabilities and damages to persons or property arising out of SRH negligence under this agreement. The parties recognize that even with the utmost care being exercised, escapement of polluting substances might occur while SRH is rendering services under this Agreement. It is therefore agreed that to the extent escapement shall occur that the responsibility to governmental authorities for such escapement is that of Time, and that Time agrees to indemnify and hold SRH harmless of and from any loss, damage, injury, liability or claim resulting from an aggravation of the existing pollution problem which is not caused or contributed to by the negligence of SRH.
- 6. SRH and its officers, employees, agents or subcontractors are not and shall not be considered employees of Time. SRH shall be considered for all purposes of this agreement and otherwise as an independent contractor.
- 7. SRH agrees at its expense to obtain all governmental permits, licenses and approvals and comply with all laws, rules, regulations and requirements now or hereafter existing necessary for the accomplishment of the work to be performed by SRH under this agreement.
- 8. SRH especially acknowledges its understanding that portions of the soil on site have been found to contain commercial pentachlorophenol in concentrations ranging from 0 ppm to 1820 ppm. SRH agrees to take all necessary precautions for the protection of SRH employees, subcontractor and property that may be required or prudent to safely accomplish work performed under this agreement.
- 3. SRH agrees to maintain workmens' compensation insurance in the form and amounts required by the laws of the State of Oregon and broad form comprehensive public liability insurance with minimum limits of \$1 million per person and \$1 million per accident for bodily injury and \$1 million per accident for property damage. SRH shall promptly deliver to Time certificates of said insurance, naming Time as an additional insured before commencing work and such certificate shall provide that said insurance shall not be cancelled prior to 30 days by written notice to Time.

10. The nature, validity and interpretation of this agreement shall be governed by the laws of the State of Washington.

Dated this 14th day of August, 1986.

TIME OIL CO.

SRH ASSOCIATES, INC.

John P. Denham

Environmental Manager

John H. Ruddick

Principal

Attachment a/s

JPD/ch

### NOT TO EXCEED COSTS

a.	
Labor	\$ 960.00
Expenses	\$ 50.00
Total	\$ 1,010.00
b.	
Labor (including subs)	\$ 5,420.00
Expenses	\$ 1,045.00
Total	\$ 6,465.00
c.	
Labor	\$ 400.00
Expenses	\$ 3,820.00
Total	\$ 4,220.00
d.	
Labor	\$ 1,300.00
Analysis	\$ 500.00
Total	\$ 1,800.00
e.	
Labor	\$ 640.00
Expenses	\$ 210.00
Total	\$ 850.00
f.	
Labor	\$ 3,200.00
Expenses	\$ 150.00
Total	\$ 3,350.00
GRAND TOTAL	\$17,695.00

### SCOPE OF WORK

## TIME OIL COMPANY PORTLAND, OREGON TERMINAL

### SAMPLING, ANALYSIS AND DATA REVIEW

### TASK 1:

Obtain six (6) surface soil samples from Time Oil Co's Portland, Oregon terminal old tank farm site for pentachlorophenol analysis. The samples will be collected from sites sampled originally by Riedel Environmental Services, Inc during initial evaluations and found to contain low, but detectable levels of pentachlorophenol. These samples will be taken following the removal of soil from these areas by Time. Specific sample locations will be indicated by Time.

### TASK 2:

Obtain soil samples from six (6) sample locations at five (5) different depths underneath the existing warehouse structure for pentachlorophenol analysis. The samples will be obtained by the split spoon technique. The locations and depths of the samples will be determined by Time.

### TASK 3:

Analyze the 36 samples obtained in tasks 1 and 2, above, for pentachlorophenol by capillary gas chromatography. Combine these data results with data generated by Riedel during initial investigations and generate plots of equal concentration contours at the five depths sampled. Prepare a report including these contours, analytical results, methodologies, etc..

### TASK 4:

Attend a one (1) day meeting at Time Oil Co's Seattle, Washington office for the purpose of reviewing Time's files and records concerning the pentachlorophenol contaminated soil issue at the North Portland Terminal. The review will be performed to develop a background report regarding activities performed, time frames, results generated, etc. during the penta investigation at North Portland.

### TASKT 5:

Perform an initial evaluation of four (4) cleanup alternatives

for remediation of pentachlorophenol contaminated soil at North Portland. Alternatives will include biodegradation, thermal extraction, in situ extraction, and incineration. No bench tests, pilot studies or in depth research will be performed. Prepare a report including a synopsis of the activities performed to date at North Portland, as identified in task 4. Perform an assessment of the economic and technical feasibility of the alternatives listed above in remediating the North Portland site.

### COST ESTIMATE

TASK 1	
Labor	<b>\$340.</b> 00
Expenses	<b>\$50.00</b>
Total	<b>\$390.00</b>
TASK 2	
Labor (including subs)	\$5420.00
Expenses	\$1045.00
Total	<b>≉6465.</b> 00
TASK 3	
Labor	<b>\$400.</b> 00
Expenses	\$2580.00
Total	<b>\$2980.</b> 00
TASK 4	
Labor	<b>\$640.00</b>
Expenses	\$210.00
Total	\$850.00

33

TASK 5

Labor

**\$3200.00** 

Expenses

\$150.00

Total

33

\$3350.00

GRAND TOTAL

\$14,035.go

# TIME OIL CO. P.O. Box 24447 Terminal Annex Seattle, WA 98124

TO: SRH A	ssociates, Inc.	WORK ORI	DER			
	John Ruddick	NO. 1 PLACE THIS NUMBER ON YOUR INVOICE				
P.O.	Box 14005 Portland, OR 97214	AND ALL CORRESPONDE				
If this block $\frac{ X }{ X }$ is checked, this work order is an addendum to contract dated $\frac{8/14/86}{ X }$ and you are authorized to perform the following additional work at the stated price(s). If this block $\frac{ X }{ X }$ is checked, this work order is not an addendum to any established contract. You are authorized to perform the following work at the stated price(s).						
	(Show street address and city of job	site)	PROPERTY NO.:			
	th Burgard, Portland, OR	. 100 05001050 1705050	104 05041050			
REQUESTED	BY: AUTHORIZED BY: DATE	E JOB REQUIRED: INSPECT	BY			
This worl	c order is expense of: $\frac{1}{x}$ TOC	OTHER	TAXABLE			
QUANTITY	DESCRIPTIO	ИС	AMOUNT			
2	Collect and analyze additional soil	samples from				
	points "T" and "Q" (1 each), 4.6' b	elow surface at	•			
	"T" and 1.9' below surface at "Q".		\$350.00			
2	Analyze previously collected surfac	· ·				
	and "58" for pentachlorophenol cont	ent.	\$200.00			
1	Analyze surface sample from point "	'K-0" for				
	pentachlorophenol content.		\$220.00			
DOUISCE DI	SCRIPTION:					
	nlorophenol Clean-up					
TIME OIL	CO. (SIGNATURE) John & Senha	DATE: August 2	1, 1986			
CONTRACTO	R (SIGNATURE)	DATE: August 2	1, 1986			

## dcold

INSURANCE BINDER
THIS BINDER IS A TEMPORARY INSURANCE CONTRACT, SUBJECT TO THE CONDITIONS SHOWN ON THE REVERSE SIDE OF THIS FORM.

Binde	r No.
511100	

NAME	AND ADDRESS OF AGENCY		COMPANY	1			- 15		
	The LEONARD ADAMS COMPANY FIREMANS F			MANS F	NS FUND INSURANCE COMPANY				
	P.O. BOX AA BEAVERTON, OREGON 97075		Effect		:01 Am	8-27 ,19			
		-	Expire			Noon 10-27 ,19			
		,			s issued to extend er expiring policy #	_		med	
NAME	AND MAILING ADDRESS OF INSURED		Descriptio	n of Oper	ation/Vehicles/Prop		OBIOW)		
•	SRH ASSOCIATES, INC.								
	123 N.E. THIRD AVE. PORTLAND, OREGON 97214								
	20112111D; 01110011 7/217								
	Type and Location of Property		Cov	erage/Pei	rils/Forms	Amt of Insurance	Ded.	Coins.	
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	Type of Insurance	Co	overage/F	orms		Limits of Liability	Aggre	gate	
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Ļ	X Products/Completed Operations Contractual				Bodily Injury &	•	.,	<del> </del>	
T Y	Other (specify below)				Property Damage	\$ 1,000,000	\$1,00	0,000	
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ŏ	Comprehensive-Deductible \$				Bodily Injury (Each	Accident)	\$		
M	Collision-Deductible \$  Medical Payments \$				Property Damage		s		
ОВ-	Uninsured Motorist \$								
E	No Fault (specify):				Bodily Injury & Pro		a:		
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				<u> </u>					
NAME	AND ADDRESS OF MORTGAGEE LOSS PAYEE	DD'L INSU	RED						
		DAN NUME	IER			· (2000년)			
	2737 W. COMMODOR WAY				1	<u>)</u> "			
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	ocd 9/25/86 VINA//	<del> </del>		,	of Authorized Represe		Date		
ACO	RD 75 (11/77-c)			LEC	DNARD ADAMS CO	OMP <u>ANY</u>	9-	-22-8	

ACORD 75 11-77-c

The transfer of the country of the

Leonard Adams Company	COMPANY Firema	ns Fund		
PO Box AA	Effective 12:	01 a m 1	August 27	13 86
Beaverton, Oregon 97075	Expires	12 01 an-	Noon Oct. 2	7≟_36_
	company pe	er expiring po	olicy #	at at tamed <del>any man</del>
	Description of Oper	ation/Vehicle	es/Property	····
SRH Associates, Inc. 123 NE Third Ave.	Enviro	nmental (	Consultant	
PO Box 14005	IMIVIEC.	incircar (	Districting	
Portland, Oregon 97214				
Type and Location of Property	C <b>o</b> veragr 'Pc	res (Forets	An Foft Ingran	oci beo i cons
Business Personal Property	All risk subje		licy \$15,000	250 90
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TOLS010975

8-27-86

## SRH Associates, Inc. environmental management

JOHN R. SPENCER JOHN H. RUDDICK GARY W. HAHN ROSS R. SIMMONS

September 29, 1986

John P. Denham Time Oil Co. PO Box 24447 Terminal Station Seattle, WA 98124-0447

Dear John:

11.56

copies of the redrawn pentachlorophenol Enclosed concentration contours from the Northwest Terminal. All contour lines depict 500 ppm intervals and are drawn to a 1 inch equals The two contours labelled "original surface PCP 20 feet scale. contours" and "original 12 foot PCP contours" are equivalent to the Riedel data redrawn using our program. The data generated at borings 1 through 6 are included, since they are very probably representative of conditions existing at the time Riedel sampled and also have little or no impact on the contours generated. curves were generated as described in chapter three of report.

The two foot contour is probably of little value since the curve was constructed on data obtained following a preliminary excavation, and since all of the values used to generate the curve were below 500 ppm, the lowest plotted interval. I have included a copy for your reference if you should ever need it.

Resampling of point K-0 was accomplished Friday, September 26. This data was used to plot the contours titled "surface PCP contours." The site was resampled on the basis of the apparent spurious results obtained during sampling performed in August.

Analysis of surface soils immediately underlying the concrete at borings number 1 and 5 (points 1-S and 5-S) indicated concentrations of 1.2 ppm and Not Detectable, respectively. Copies of these results and a copy of the chain of custody/analytical request form for the resampling of point K-O are enclosed. Also enclosed is an 8.5X11 inch copy of the soil washing schematic.

A copy of our invoice is included, which delineates the billing for each task and for the additional work performed according to the work order that is also included.

PO BOX 14005 123 NE THIRD AVE. PORTLAND, OR 97214 (503) 232-0824

Please call me if you have any questions or comments. I look forward to working with you again, and have enjoyed the working relationship our companies have developed.

Sincerely,

John H. Ruddick Principal

### INVOICE

JOHN R. SPENCER JOHN H. RUDDICK GARY W. HAHN ROSS R. SIMMONS

TO: John Denham

Time Oil Co. PPO Box 24447

Terminal Annex

Seattle, Washington 98124 DATE: 10/1/86

INVOICE NO: 30129

PROJECT NO: 1003

For professional services rendered as described below, following amount is due and payable:

Investigation of Pentachlorophenol Contamination at TOC Northwest Terminal, Portland, Oregon, as per contract dated 8/14/86

Labor .

11,105.00

Expenses

6,680.00

TOTAL

17,695.00

(see detail on attached pages)

Sampling and Analytical tasks performed as addendum to contract dated 8/14/86, per work order #1 attached

Labor

340.00

Expenses

430.00

TOTAL

770.00

(see detail on attached pages)

TOTAL DUE

\$ 18,465.00

PORTLAND, OR 97214 123 NE THIRD AVE. PO BOX 14005

(503) 232-0824

### DETAIL OF CHARGES

#1003

Time Oil Co.

### TASK A - SURFACE SAMPLES

	<u>Date</u>		Who	<u>Hrs</u>	Rate	\$
	8/17 8/24	v v s1	jhr jhr	3.5 7.0		140.00 560.00
	TOTAL LA	BOR		13.5		700.00
	8/17 8/24	Misc Misc				8.40 208.81
	TOTAL EX	PENSES				217.21
TOTAL TAS	SK A					917.21
TASK B -	SOIL BORI	NGS				
	8/24 8/31	*		23.5 13.0	80 80	1880.00 1040.00
	TOTAL LA	BOR		36.5		2920.00
	8/24 9/1 9/1	Misc	. Exp	enses enses Tech.		701.57 129.59 460.00
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TOTAL TAS	SK B					4211.16

### TASK C - SOIL SAMPLE ANALYSIS

<u>Date</u>		<u>Who</u>	<u>Hrs</u>	<u>Rate</u>	<u>\$</u>
8/24		TUD	2 0	80	160.00
8/31			2.0 3.0		120.00
TOTAL	LABOR	٠	5.0		280.00
9/1 9/1	Misc. Analy	Exp sis	enses (Lab)		44.28 3448.00
TOTAL	EXPENSES	•			3492.28
TOTAL TASK C	· · · · ·				3772.28
TASK D - WELL SA	AMPLING AN	D AN	ALYSI	S	
8/24	•	JHR	4.0	80	320.00
8/31	•	GWH	4.0 2.0 16.0 9.0	60	120.00
6/31	•	GWH	9.0	40	360.00
9/7	•	JHR	6.5	40	260.00
TOTAL	LABOR		37.5	-	2340.00
8/24		Exp	enses		269.42
9/1 9/8	Misc.	Exp	enses		346.50
9/8	Misc.				66.73
9/8	Analy	212	(Lab)		563.50
TOTAL	EXPENSES				1246.15
TOTAL TASK D	est.				3586.15
TASK E - REVIEW	OF FILES				
8/24	i	JHR	8.0	80	640.00
TOTAL	LABOR		8.0		640.00
8/24	Misc.	Exp	enses		201.23
TOTAL	EXPENSES				201.23
TOTAL TASK E		<i>:</i>			841.23

### TASK F - REPORT PREPARATION

	<u>Date</u>	<u>Who</u>	<u>Hrs</u>	<u>Rate</u>	<u>s</u> .
	8/31			80	1400.00
	0./7			50 50	575.00
	9/7		9.0 3.0	50 80	450.00 240.00
•	9/8	JHR	10.5	60	630.00
	9/9	JHR	8.0	60	480.00
	9/10	JHR	6.0	60	360.00
	TOTAL LABOR		64.5		4135.00
	9/7 Misc Copi		enses		223.37 8.60
	TOTAL EXPENSES	;			231.97
TOTAL TAS	к ғ			-	4366.97
PROJECT G	RAND TOTAL			]	L7,695.00

### DETAIL OF CHARGES Addendum to Contract

ADDENDUM GRAND TOTAL

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				* 5,
TASK 1 - SOIL SAMPLING A	AND AN	ALYSI	s/POIN	TS T AND
<u>Date</u>	<u>Who</u>	<u>Hrs</u>	<u>Rate</u>	<u>\$</u>
8/31	JHR	2.5	80	200.00
TOTAL LABOR				200.00
				10.00 140.00
TOTAL EXPENSES	,			150.00
TOTAL TASK 1				350.00
TASK 2 - ANALYSIS OF SAM	IPLES	1S AN	D 5S	
9/10	JHR	1.0	60	60.00
TOTAL LABOR		-		60.00
9/10	Lab	Analy	sis	140.00
TOTAL EXPENSES				140.00
TOTAL TASK 2				200.00
TASK 3 - ANALYSIS OF SAM	IPLE K	<b>-0</b>		
9/26	JHR	2.0	40	80.00
TOTAL LABOR				80.00
9/29	Lab	Analy	sis	140.00
TOTAL EXPENSES	<b>;</b>		•	140.00
TOTAL TASK 3				220.00

TOLS010982

770.00

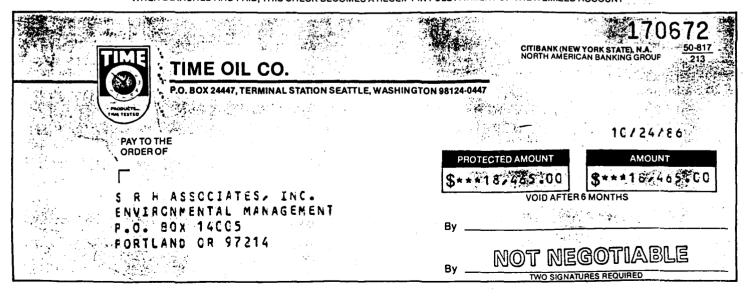
TIME OIL CO.

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WHEN DETACHED AND PAID, THIS CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE ITEMIZED ACCOUNT



## SRH ASSOCIATES, INC.

INVOICE

JOHN R. SPENCER JOHN H. RUDDICK GARY W. HAHN ROSS R. SIMMONS

TO: John Denham

Time Oil Co.

PPO Box 24447

Terminal Annex

Seattle, Washington 98124

DATE: 10/1/86

INVOICE NO: 30129

PROJECT NO: 1003

For professional services rendered as described below, the following amount is due and payable:

Investigation of Pentachlorophenol Contamination at TOC Northwest Terminal, Portland, Oregon, as per contract dated 8/14/86

Labor

11,105.00

Expenses

6,680.00

TOTAL

17,695.00

(see detail on attached pages)

Sampling and Analytical tasks performed as addendum to contract dated 8/14/86, per work order #1 attached

Labor

Expenses

430.00

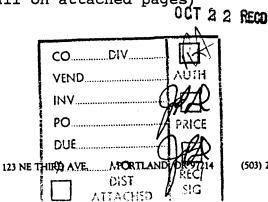
TOTAL

PO BOX 14005

770.00

(see detail on attached pages)

TOTAL DUE



\$ 18,465.00

(503) 232-0824

### DETAIL OF CHARGES

#1003

Time Oil Co.

### TASK A - SURFACE SAMPLES

<u>Date</u>	<u>Who</u>	<u>Hrs</u>	<u>Rate</u>	<u>\$</u>
8/17 8/24	jhr jhr	3.5 7.0	40 80	140.00 560.00
TOTAL L	ABOR	13.5		700.00
8/17 8/24	Misc. Exp Misc. Exp			8.40 208.81
TOTAL E	XPENSES .			217.21
TOTAL TASK A				917.21
TASK B - SOIL BOR	INGS			
8/24 8/31		23.5 13.0		1880.00 1040.00
TOTAL L	ABOR	36.5		2920.00
8/24 9/1 9/1	Misc. Exp Misc. Exp Sampling	enses		701.57 129.59 460.00
TOTAL EX	KPENSES			1291.16
TOTAL TASK B				4211.16



TASK C - SOIL SAMPLE ANALYSIS

	<u>Date</u>		<u>Who</u>	<u>Hrs</u>	<u>Rate</u>	<u>\$</u>
	8/24 8/31					160.00 120.00
	TOTAL LABO	OR		5.0		280.00
	9/1 9/1	Misc. Analy	Exp	enses (Lab)		44.28 3448.00
	TOTAL EXPI	ENSES				3492.28
TOTAL TASK	: <b>c</b>					3772.28
TASK D - W	ELL SAMPL	ING AN	D AN	ALYSIS	5	
• •	8/24		JHR GWH	4.0 2.0 16.0 9.0	80 60	320.00 120.00
	8/31		JHR GWH	9.0	40	1280.00 360.00
	9/7		JHR	6.5	40	260.00
	TOTAL LABO	OR		37.5		2340.00
	8/24 9/1	Misc.	Exp	enses		269.42 346.50
	9/1 9/8 9/8	Misc.	Exp	enses		66.73
	9/8	Analy	sis	(Lab)		563.50
	TOTAL EXPI	ENSES				1246.15
TOTAL TASK	D					3586.15
TASK E - R	EVIEW OF B	FILES				
	8/24	•	JHR	8.0	80	640.00
	TOTAL LABO	OR		8.0		640.00
	8/24	Misc.	Exp	enses		201.23
ı	TOTAL EXPE	ENSES				201.23
TOTAL TASK	E				ر. معند	841.23

### TASK F - REPORT PREPARATION

PROJECT GRAND TOTAL

<u>Da</u>	<u>te</u>	Who	<u>Hrs</u>	<u>Rate</u>	<u>\$</u>
8/		RRS	17.5 11.5	50	1400.00 575.00
9/	<b>7</b>		9.0 3.0	50 80	450.00 240.00
9/	8	JHR	10.5	60	630.00
9/	9	JHR	8.0	60	480.00
9/	10	JHR	6.0	60	360.00
TO	TAL LABO	<b>R</b>	64.5		4135.00
<b>9/</b> *		Misc. Exp Copies	enses		223.37 8.60
TO	TAL EXPE	NSES			231.97
TOTAL TASK F					4366.97



17,695.00

### DETAIL OF CHARGES Addendum to Contract

TASK 1 - SOIL SAMPLING AND ANALYSIS/POINTS T AND Q	TASK	1 .	- SOIL	SAMPLING	AND	ANALYSIS,	/POINTS	${f T}$	AND	Q
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Dat	<u>:e</u>	<u>Who</u>	<u>Hrs</u>	<u>Rate</u>	<u>\$</u>
8/3	31	JHR	2.5	80	200.00
TOT	CAL LABOR				200.00
8/3 9/8					10.00 140.00
TOT	TAL EXPENSES				150.00
TOTAL TASK 1		<del>-</del>			350.00
TASK 2 - ANALYSIS OF SAMPLES 1S AND 5S					
9/1	60	60.00			

TOTAL	LABOR		60.00
9/10	Lab	Analysis 1	40.00
TOTAL	EXPENSES	1	40.00

TOTAL TASK 2 200.00

### TASK 3 - ANALYSIS OF SAMPLE K-0

9/26	JHR 2.0 40	80.00
TOTAL LABOR		80.00
9/29	Lab Analysis	140.00
TOTAL EXPENSE	S	140.00

TOTAL TASK 3

ADDENDUM GRAND TOTAL

# TIME OIL CO. P.O. Box 24447 Terminal Annex Seattle, WA 98124

TO: SRH Assoc	iates, Inc.		WORK OR	DER
Attn: John	n Ruddick	PLACE THIS	NO. 1	N YOUR INVOICE
P.O. Box	14005 Portland, OR 97214	AND ALL CO		
8/14/86 the stated pr If this block	X   is checked, this work ordered and you are authorized to perfice(s).     is checked, this work ordered are authorized to perform the	form the foll er is not an	lowing add	itional work at to any established
ADDRESS: (Show	street address and city of job	site)		PROPERTY NO.:
12005 North B	urgard, Portland, OR			
REQUESTED BY:	AUTHORIZED BY: DATE	E JOB REQUIRE	1 11	TION REQUIRED: BY
This work ord	er is expense of: $\left \frac{1}{x}\right $ TOC	TOTHER		TAXABLE  _
QUANTITY	DESCRIPTIO	NC		AMOUNT
2 Col.	lect and analyze additional soil	samples fro	m	÷ .
poi	nts "T" and "Q" (1 each), 4.6' b	elow surface	at	
"Т"	and 1.9' below surface at "Q".			\$350.00
		-		
2 Ana	lyze previously collected surfac	e samples "1	s''	
and	"5S" for pentachlorophenol cont	ent.		\$200.00
	lyze surface sample from point "	'K-0" for		2000 00
pen	tachlorophenol content.			\$220.00
PROJECT DESCRI	PTION:			
	phenol Clean-up	•		
TIME OIL CO. (	SIGNATURE) John & Sinh		DATE: August 2	21. 1986
CONTRACTOR (SI	GNATURE)	02	DATE: August 2	

JOHN R. SPENCER JOHN H. RUDDICK GARY W. HAHN ROSS R. SIMMONS

December 19, 1986

Mr. John P. Denham Time Oil Co. 2737 West Commodore Way Seattle, WA 98124-0447

Dear John:

Enclosed is a copy of a proposal and cost estimate for bench scale feasibility studies for soil washing at the Northwest Terminal site. I have tried to phase the study so that it will become apparent at the earliest time whether or not to proceed with further activities.

Read through this at your leisure and make any notes. When you return from the holidays, give me a call and I'll be happy to review the proposal and answer any questions you may have.

Have an enjoyable Christmas and New Year. I look forward to seeing you again.

Sincerely,

John H. Ruddick Principal

PO BOX 14005 123 NE THIRD AVE. PORTLAND, OR 97214 (503) 232-0824

### PROPOSAL AND COST ESTIMATE

# BENCH SCALE FEASIBILITY STUDIES FOR THE ELUTION OF PCP FROM CONTAMINATED SOIL

**DECEMBER 19, 1986** 

Prepared for:

TIME OIL COMPANY 2737 WEST COMMODORE WAY SEATTLE, WASHINGTON

Prepared by:

SRH ASSOCIATES, INC.

123 NE THIRD AVE, SUITE 230
PORTLAND, OREGON 97232
(503) 232-0824

### INTRODUCTION

Time Oil Co. has been investigating the nature and extent of soil and groundwater contamination at its Northwest Terminal facility located in Portland, Or. as a result of pentachlorophenol (PCF) releases which occurred at that site over a period of several years. The results of this investigation indicate that the sandy soils to the south of the wood treating chemicals warehouse are contaminated with PCP at concentrations ranging up to several thousand parts per million.

As a result of these findings, Time has performed a preliminary analysis of potential remedial alternatives for the contaminated soils at the site. Due to existing bans on landfilling of the waste (categorized by EPA as listed hazardous waste number F027) and due to Time's expressed interest in preventing further environmental impairment from this site, few alternatives were concluded to be viable. Since this evaluation, the residual from the incineration or thermal treatment of F027 contaminated soils have been upheld as being a separately listed hazardous waste (F028), making such thermal unsatisfactory remedial alternatives for Time since the resulting soils could not reasonably be expected to be easily delisted from hazardous status.

On the basis of Time's evaluation of the available remedial alternatives and the above information, an assessment of soil washing technology was recommended. Soil washing involves the extraction of wastes from soils using solvents, surfactants or other solutions. The current status of soil washing technology is generally regarded as developmental, however it represents one of the more advanced technologies available to Time in light of the restrictions placed on landfilling, incineration, and closure of the wastes in place. Assessment of this process is consistent with EPA's Research, Development and Demonstration (RD&D) protocols which ultimately require a demonstration to the agency of the effectiveness and limitations of a waste treatment technology prior to its implementation.

The following is a proposed scope of work and cost estimate for a bench scale evaluation of soil washing protocols for application to Time's PCP contaminated soil. The proposal defines the work necessary to review existing literature and to perform bench scale studies to generate data which confirm or reject the assumption that soil washing technologies can successfully clean up Time's contaminated soils. The proposed scope of work does not, at this time, include pilot scale studies, which ordinarily follow bench scale determinations, since it is misleading to attempt to define the scope of work or costs associated with the pilot phase of the project until such time as bench scale results define an appropriate process for scale-up considerations.

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#### SCOPE OF WORK

#### OVERVIEW

The complete investigation of the feasibility of using soil washing procedures to remediate soils at Time's Northwest Terminal includes the following tasks:

- o Review of existing literature and regulations.
- o Performance of bench scale experiments.
- o Evaluation of bench scale results and execution of a decision to continue or terminate the investigation.
- o Performance of pilot scale experiments.
- o Determination of the economic feasibility of the projected process and execution of a decision to proceed or terminate the investigation.
- o Engineering and design of process equipment, if not commercially available.
- o Fabrication of unavailable equipment and implementation of the process for EPA demonstration and subsequent cleanup activities.

This proposal addresses only the first phase of the project which includes the first three tasks. Segmenting the project into rational phases with decision points at which to appraise the value of proceeding following completion of each phase, permits stricter control over the project and allows better estimation of the scope of work and costs involved with each phase. The phases may be described as follows:

- o Bench scale studies
- o Pilot scale studies
- o Engineering and Implementation

The detailed scope of work and cost estimate for the bench scale study phase of this project is presented below.

BENCH SCALE STUDIES

3

The bench scale studies are intended to generate sufficient data to allow Time to make an informed decision to proceed with or abandon the project with a minimal amount of capital expended. The tasks associated with this phase are designed to evaluate three different soil washing procedures, to define the parameters associated with their use, to characterize the soil chemistry and the spectrum of contaminants in the PCP contaminated soil at Time's Northwest Terminal facility, to select the most effective soil washing procedure based on bench study results, to define the nature of the recovered elutriate solution generated during soil washing, and to assess methods for destruction of the contaminants found in that elutriate. The following is a detailed task breakdown to accomplish these objectives.

#### Task 1 - Review Current Regulations

To reduce the risk of new regulations or new interpretations of existing regulations unfavorably impacting this study, SRH will discuss the status of regulations affecting soil washing technology with EPA representatives from Region X, Waste Management Branch, Hazardous Waste Division, Seattle; EPA Headquarters, Office of Solid Waste, Washington, D.C.; and the Office of Research and Development (ORD), Cincinnati, OH.. Key EPA personnel will be queried regarding the current and pending status of regulations regarding PCP treatment technologies. Emphasis will be placed on extraction procedures. Particular effort will be placed on discussions with representatives from the Alternative Treatment Technologies Section of ORD to not only review the regulations associated with extraction of PCP contaminated soils, but to also determine the status of research being performed by EPA in this area.

# Task 2 - Review Current Extraction Literature

SRH will review existing extraction technology by examining literature in the fields of hazardous waste extraction, food processing technology (specifically edible oils) and metal recovery and mining (ore leaching). In addition to the discussions with ORD described under task 1, EPA's list of internal publications will be reviewed to identify, obtain copies of, and subsequently review EPA literature in this field. General extraction theory will be reviewed using current texts. U.S. patent literature will be reviewed to appraise the status of engineering in this field. Manufacturers of extraction equipment will be contacted to determine the commercial availability of extraction equipment and to allow initial estimates of potential costs.

SRH will present the results of tasks 1 through 3 to Time Oil Company representatives at Time's offices in Seattle as a part of

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task 2. This meeting will be conducted to review findings and to refine the scope of work relative to the development of the bench scale study plan.

## Task 3 - Evaluate the Nature of the Wastes to be Treated

SRH will determine the porosity, grain size distribution, organic carbon content and other critical parameters of Time's contaminated soil which affect the extraction of PCP and any other identified contaminants from the soil. SRH will determine the presence and nature of contaminants other than PCP in the soil. Samples of soil from the Northwest Terminal PCP site will be taken and evaluated for priority pollutants by GC/MS, ICP and other appropriate analytical techniques with identification of other major peaks as indicated. Specifically, soil will be evaluated for grain size (particle size distribution), soil type, porosity, specific gravity, moisture content, pH, total organic carbon and oil and grease levels. Two samples are proposed for each test to allow for an estimation of the range of concentration of the contaminants found.

# Task 4 - Develop an Initial Plan for Bench Scale Studies

The information generated in tasks 1 through 3 will be used to refine the experimental approaches needed to complete bench scale studies. The following proposed plan is expected to undergo modification based on those results.

This investigatory plan is based on extraction theory and the existing literature but is heavily weighted towards existing and available technology and equipment. It is intended to quickly produce sufficient results to allow Time to determine if further pursuit of the project is warranted.

Extractability of soil contaminants will be initially evaluated using simple jar tests. Jar tests will be performed by introducing a known amount of contaminated soil into a beaker containing a fixed volume of extracting solution. The material will be agitated for a fixed period of time at a known temperature. Following this protocol, the filtered solution and the extracted soil will be analyzed for PCP and the extraction ratio determined.

Organic solvents, elevated pH solutions and aqueous solutions of surfactants will be evaluated. Four solvents, four different pH levels and four different surfactants will be evaluated. Based on the observed results, relative costs, safety and environmental considerations, two different elutriating solutions will be selected for further

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evaluation, including optimization of extraction conditions. The effect of the extraction procedure on contaminants other than PCP which have been determined to be present in the soil will be assessed by analysis of the extract and the residual soil for these materials. Conditions indicative of a potentially successful soil cleaning process will be pursued for optimization of the batch process. To optimize the process, the extracting conditions will be varied with respect to surfactant concentration, extraction time, temperature and/or pH, as appropriate, to maximize the removal of PCP and other contaminants from the soil. It should be noted that different contaminants may require different extraction solutions (or combinations of solutions). SRH believes that PCP and oil are the principal contaminants and a single extraction solution may be used to remove both substances from Time's soil.

When the batch process has been optimized in the above fashion, samples of the elutriate will be analyzed for all identified contaminants. A description of the elutriate solution will be prepared to allow for evaluation of elutriate treatment alternatives. At this time, it is expected that oxidation or reduction of the waste material represents a potential treatment option but that final selection of a suitable treatment will require a precise understanding of what contaminating materials, other than PCP, may be present.

The optimized solution will be used to compare three extraction procedures, as appropriate, i.e. sequenced batch, countercurrent, and reflux (Soxhlet) extractions. These processes can be conducted in bench scale, laboratory apparatus which is either currently owned by or generally available to SRH. The objective of this set of tests is to optimize the extraction procedure by improving efficiency and minimizing the quantities of solution required. study will necessarily be contingent upon the extraction solutions selected. For example, since caustic and surfactant solutions are not generally volatile, Soxhlet procedures would not be applicable to these solutions and therefore would not be evaluated. Conversely, if an organic solvent is indicated as the elutriating solution, it may be necessary to remove the residual solvent from the extracted soil prior to discharge from the extractor. In this case, sequenced batch extraction may be favored while continuous processes such as countercurrent or soxhlet extraction would be contraindicated.

The last evaluation in the bench scale phase of the project is the determination of a treatment method for the extracted material. Although this evaluation will ultimately depend on the nature of the material as produced, it is believed

that oxidation/reduction or separatory methods represent likely candidates. For example, if the extraction is performed using caustic solutions, acidification of the extract to a pH < 5.0 may precipitate significant amounts of PCP due to the reduced solubility of this compound in its acid form. Conversely, if large amounts of oil are present, it may be necessary to utilize a solvent as the extractant, in which case removal of the solvent and treatment of the residual material through peroxide, permanganate, or other chemical oxidation process, chemical reduction, or physical adsorption onto organic or inorganic substrates may be preferred.

The plan will be developed in close association with Time Oil Co. personnel to ensure that the resultant plan meets Time's expectations and requirements.

## Task 5 - Implement Bench Scale Study Plan

SRH will conduct the implementation of the study as planned in task 4, above. The plan, which will have been developed in close coordination with Time Oil Company, will have the following components for the sake of discussion and cost estimation:

- o perform 12 initial jar tests
- o analyze 24 PCP samples from initial jar tests
- o perform 6 secondary jar tests
- o analyze 12 PCP samples from secondary jar tests
- o perform 4 jar tests for optimization
- o analyze 8 PCP samples from optimization jar tests
- o analyze 6 PCP samples from process emulating extractions
- o analyze optimized extract from optimized jar test for all identified contaminants
- o perform 4 separatory tests on optimized extract
- o perform 3 oxidation tests on optimized extract
- o perform 2 reduction tests on optimized extract
- o analyze effluent from the above extract destruction tests (9 PCP analyses)
- o analyze 1 effluent sample for all identified contaminants

The results of the bench scale study will be a summary report to Time Oil Co. indicating the success or failure of the soil washing process at the bench scale level and projecting the probability for success of a pilot level scale-up.

SRH has evaluated the topic of PCP extraction from soil and is

7

aware that extensive work has already been performed in assessing the extraction efficiency of this material from soils in an EPA directed extraction procedure for preparing samples for quantitative analysis. This work, done to provide a means for analyzing contaminated soil, has direct bearing on this project, and leads SRH to conclude that reflux extractions may pose a viable and well documented process for PCP contaminated soil remediation. To date, SRH is unaware of any commercial effort to decontaminate soils by this process.

# Task 6 - Prepare Report and Submit Recommendations

SRH will prepare a summary report presenting the data, conclusions and its recommendations to Time Oil Company. The report will include copies of experimental protocols and analytical results and will present a summary of the results and their significance to allow Time Oil Company to determine if further pursuit of this project is warranted. SRH will also attend a one day meeting at Time's offices in Seattle to review the results and conclusions with Time's representatives.

#### COST ESTIMATE

Although the precise determination of the costs associated with any developmental process is difficult due to the large potential for project reorientation based on new results and findings, SRH believes that the following cost estimates provide a good foundation for project assessment. SRH proposes to perform the work on a time and materials basis according to its current rate schedule. The estimated costs presented herein would not be exceeded without prior authorization from Time.

A detailed cost estimate breakdown is presented in figure 1. SRH suggests that the estimate be reviewed following the completion of tasks 1 - 3, to reflect information obtained during these activities which could impact the assumptions made in estimated tasks 4 through 6. SRH estimates the total bench scale phase costs to be \$37,868 including labor and expenses.

TABLE 1 - COST ESTIMATE DETAIL

TASK	PERSONNEL	HOURS	COST
TASK 1 - REVIEW CUR	RENT REGULATION	s	
LABOR	REG. SPEC. CLER	24.0 8.0	\$1,920.00 \$216.00
	TOTAL	32.0	\$2,136.00
EXPENSES	MISC.		\$200.00
	TOTAL		\$200.00
TOTAL			\$2,336.00
TASK 2 - REVIEW CUR	RENT EXTRACTION	LITERATU	RE
TASK 2A - REVIEW LI	TERATURE		
LABOR	SR. SCI CLER CHEM	32.0 8.0 10.0	\$2,560.00 \$216.00 \$500.00
	TOTAL	50.0	\$3,276.00
EXPENSES	MISC.		\$200.00
	TOTAL		\$200.00
TOTAL			\$3,476.00
TASK 2B - MEETING W	ITH TIME OIL CO		
LABOR	PRIN	8.0	\$640.00
	TOTAL	8.0	\$640.00
EXPENSES	MISC.		\$200.00
	TOTAL		\$200.00
TOTAL			\$840.00

	TOTAL TASK	2		\$4,316.00
TASK 3 -	EVALUATE N	ATURE OF WASTES		
	LABOR	SR. SCI CLER CHEM GEOL	16.0 8.0 8.0 8.0	\$1,280.00 \$216.00 \$400.00 \$480.00
		TOTAL	40.0	\$2,376.00
	EXPENSES	MISC. ANALYTICAL TOTAL		\$300.00 \$4,105.50 \$4,405.50
	TOTAL			\$6,781.50
TASK 4 -	DEVELOP ST	UDY PLAN		
	LABOR	SR. SCI CLER	24.0 10.0	\$1,920.00 \$270.00
		TOTAL	34.0	\$2,190.00
	EXPENSES	MISC.		\$100.00
		TOTAL		\$100.00
	TOTAL			\$2,290.00
TASK 5 -	IMPLEMENT 1	BENCH SCALE STUD	Y	
	LABOR	SR. SCI CLER CHEM GEOL TECH TOTAL	40.0 16.0 72.0 24.0 40.0	\$3,200.00 \$432.00 \$3,600.00 \$1,440.00 \$1,600.00 \$10,272.00
	EXPENSES	MISC. ANALYTICAL COMPUTER OTHER LABORATOR TOTAL	ΥΥ	\$350.00 \$9,487.50 \$150.00 \$3,421.25 \$13,408.75
	TOTAL			\$23,680.75

TASK 6 - REPORT AND RECOMMENDATIONS

TASK	6A	_	PR.	EPA	RE	REPORT

	LABOR	SR. SCI ADMIN CHEM CLER	8.0 8.0 5.0 8.0	\$640.00 \$480.00 \$250.00 \$216.00
		TOTAL	29.0	\$1,586.00
	EXPENSES	MISC.		\$200.00
		TOTAL		\$200.00
	TOTAL			\$1,786.00
TASK 6B	- MEETING W	VITH TIME OIL CO		
	LABOR	PRIN	8.0	\$640.00
		TOTAL	8.0	\$640.00
	EXPENSES	MISC.		\$200.00
		TOTAL		\$200.00
	TOTAL			\$840.00
	TOTAL TASK	<b>3</b> 6		\$2,626.00
PROJECT	TOTAL			\$42,030.25

#### MEMORANDUM

January 8, 1987

TO:

Robert Abendroth

Seattle

FROM:

John Denham

Seattle

SUBJECT: PENTACHLOROPHENOL CONTAMINATION - NORTHWEST TERMINAL

As a follow-up of my September 30, 1986 memo and SRH report on above subject, attached is detail and cost estimate for accomplishing bench scale feasibility study - the next step in correcting this contamination problem.

Request your signature on and return of attached purchase order so we can get on with this project.

Attachment a/s

JPO/ch

January 13, 1987

TO:

File

FROM:

John Denham

Robert advised he would not sign P.O. 65902, asked that I try to contact Don Marion (Koppers) and request money, then send Koppers the data presented by SRH as of September 30, 1986 and include SRH proposal dated December 19, 1986.

This was done 1/14/87.

TIME OF TESTER TO

# TIME OIL CO.

PURCHASE ORDER

P.O. BOX 24447 • TERMINAL ANNEX
2737 WEST COMMODORE WAY • SEATTLE, WASHINGTON 98124-0447
(206) 285-2400

No. 65902

PLACE THIS NUMBER ON YOUR INVOICE AND ALL

то	S	RH Associ	ates, In	ic.			Col		ENCE
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THE SYSTEMS PEOPLE CONCOOR (204) 641-5800

# NORTHWEST TERMINAL PENTACHLOROPHENOL CLEANUP BENCH SCALE FEASIBILITY STUDY SRH ASSOC. 10/19/86

TASK	COST
1. REVIEW REGULATIONS 2. REVIEW LITERATURE 3. EVALUATE WASTES 4. DEVELOP FLAN 5. CONDUCT TEST	2,336 4,316 6,781 2,290 23,680
6. PREPARE REPORT	2,626
TOTAL	\$42,029

# SRH ASSOCIATES, INC. ENVIRONMENTAL MANAGEMENT

JOHN R. SPENCER JOHN H. RUDDICK GARY W. HAHN ROSS R. SIMMONS

January 6, 1987

Mr. John P. Denham Time Oil Co. 2737 West Commodore Way Seattle, WA 98124-0447

Dear John:

Enclosed is a copy of a proposal and cost estimate for bench scale feasibility studies for soil washing at the Northwest Terminal site. I have phased the study so that it will become apparent at the earliest time whether or not to proceed with further activities.

Please read through this at your leisure and make any notes. When your schedule permits, feel free to give me a call and I'll be happy to review the proposal and answer any questions you may have.

I trust you had an enjoyable Christmas and New Year. I look forward to seeing you soon.

Sincerely,

John H. Ruddick /Principal

TOLS011005

PO BOX 14005 123 NE THIRD AVE. PORTLAND, OR 97214 (503) 232-0824

# PROPOSAL AND COST ESTIMATE

BENCH SCALE FEASIBILITY STUDIES FOR THE ELUTION OF PCP FROM CONTAMINATED SOIL

**DECEMBER 19, 1986** 

Prepared for:

TIME OIL COMPANY 2737 WEST COMMODORE WAY SEATTLE, WASHINGTON

Prepared by:

SRH ASSOCIATES, INC.
123 NE THIRD AVE, SUITE 230
PORTLAND, OREGON 97232
(503) 232-0824

#### INTRODUCTION

Time Oil Co. has been investigating the nature and extent of soil and groundwater contamination at its Northwest Terminal facility located in Portland, Or. as a result of pentachlorophenol (PCP) releases which occurred at that site over a period of several years. The results of this investigation indicate that the sandy soils to the south of the wood treating chemicals warehouse are contaminated with PCP at concentrations ranging up to several thousand parts per million.

As a result of these findings, Time has performed a preliminary analysis of potential remedial alternatives for the contaminated soils at the site. Due to existing bans on landfilling of the waste (categorized by EPA as listed hazardous waste number F027) and due to Time's expressed interest in preventing further environmental impairment from this site, few alternatives were concluded to be viable. In October of 1986, SRH Associates conducted a review of all available alternatives for the disposal or treatment of Time's PCP contaminated soil. Since this evaluation, the residual soils from the incineration or thermal treatment of F027 contaminated soils have been upheld as being a separately listed hazardous waste (F028), making such thermal processes unsatisfactory remedial alternatives for Time since the resulting soils could not reasonably be expected to be easily delisted from hazardous status.

On the basis of these cumulative findings, no commercially available, licensed process was identified that was capable of treating or disposing of Time's PCP contaminated soils. Several developmental technologies were identified that appeared to have the capability to achieve Time's objectives but which had not been commercialized or demonstrated under conditions found at the Northwest Terminal facility.

On the basis of Time's evaluation of the available remedial alternatives and the above information, a site assessment of soil washing technology was recommended. "Pentachlorophenol Contamination, Northwest Terminal, Report Section II, pg. 20) Soil washing involves the extraction of wastes from soils using solvents, surfactants or other solutions. The current status of soil washing technology is generally regarded as developmental, however it represents one of the more advanced technologies available to Time in light of restrictions placed on landfilling, incineration, and closure of Assessment of this process is consistent the wastes in place. EPA's Research, Development and Demonstration protocols which ultimately require a demonstration to the agency of the effectiveness and limitations of a waste treatment technology prior to its implementation.

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The Northwest Terminal contamination is of such a nature that some degree of demonstration to the regulatory agencies of any cleanup process can be expected to be required prior to the implementation of cleanup efforts. This requirement can be expected due to existing regulations, the extent of contamination at Northwest Terminal, and the potential for the presence of dioxin in the wastes.

The following is a proposed scope of work and cost estimate for a bench scale evaluation of soil washing protocols for application to Time's PCP contaminated soil. The proposal defines the work necessary to review existing literature and to perform bench scale studies to generate data which confirm or reject the assumption that soil washing technologies can successfully clean up Time's contaminated soils. The proposed scope of work does not, at this time, include pilot scale studies, which ordinarily follow bench scale determinations, since it is misleading to attempt to define the scope of work or costs associated with the pilot phase of the project until such time as bench scale results define an appropriate process for scale-up considerations.

#### SCOPE OF WORK

#### OVERVIEW

The complete investigation of the feasibility of using soil washing procedures to remediate soils at Time's Northwest Terminal includes the following tasks:

- o Review of existing literature and regulations.
- o Performance of bench scale experiments.
- o Evaluation of bench scale results and execution of a decision to continue or terminate the investigation.
- o Performance of pilot scale experiments.
- o Determination of the economic feasibility of the projected process and execution of a decision to proceed or terminate the investigation.
- o Engineering and design of process equipment, if not commercially available.
- o Fabrication of unavailable equipment and implementation of the process for EPA demonstration and subsequent cleanup activities.

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This proposal addresses only the first phase of the project which includes the first three tasks. Segmenting the project into rational phases with decision points at which to appraise the value of proceeding following completion of each phase, permits stricter control over the project and allows better estimation of the scope of work and costs involved with each phase. The phases may be described as follows:

- o Bench scale studies
- o Pilot scale studies
- o Engineering and Implementation

The detailed scope of work and cost estimate for the bench scale study phase of this project is presented below.

#### BENCH SCALE STUDIES

The bench scale studies are intended to generate sufficient data to allow Time to make an informed decision to proceed with or abandon the project with a minimal amount of capital expended. The tasks associated with this phase are designed to evaluate three different soil washing procedures, to define the parameters associated with their use, to characterize the soil chemistry and the spectrum of contaminants in the PCP contaminated soil at Time's Northwest Terminal facility, to select the most effective soil washing procedure based on bench study results, to define the nature of the recovered elutriate solution generated during soil washing, and to assess methods for destruction of the contaminants found in that elutriate. The following is a detailed task breakdown to accomplish these objectives.

#### Task 1 - Review Current Regulations

To reduce the risk of new regulations or new interpretations of existing regulations unfavorably impacting this study, SRH will appraise the status of regulations affecting soil washing technology. These evaluations are necessary to prevent the expenditure of time investigating technologies which are generally regarded as unpermittable and to preclude the potential for regulatory violations and fines. Perhaps the most functional purpose of this task is to provide Time with both regulatory and political data to properly prepare submittals to EPA and DEQ in order to expedite acceptance of plans, permits and other communications.

EPA representatives from Region X, Waste Management Branch, Hazardous Waste Division, Seattle; EPA Headquarters, Office of Solid Waste, Washington, D.C.; and the Office of Research and

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Development (ORD), Cincinnati, OH., will be queried regarding the current and pending status of regulations regarding PCP treatment technologies. SRH proposes to solicit and evaluate information received from these agencies in a confidential manner to allow Time Oil Co. access to unbiased information and to develop strategies which are expeditious due to their regulatory and political acceptability. Emphasis will be placed Particular effort will be placed on extraction procedures. discussions with representatives from the Alternative Treatment Technologies Section of ORD to not only review the regulations associated with extraction of PCP contaminated soils, but to also determine the status of research being performed by EPA in this area.

This task is expected to require 2 weeks for completion with an estimated cost of \$2,336.

#### Task 2 - Review Current Extraction Literature

SRH will review existing extraction technology by examining literature in the fields of hazardous waste extraction, food processing technology (specifically edible oils) and metal recovery and mining (ore leaching). In addition to the discussions with ORD described under task 1, EPA's list of internal publications will be reviewed to identify, obtain copies of, and subsequently review EPA literature in this field. General extraction theory will be reviewed using current texts. U.S. patent literature will be reviewed to appraise the status of engineering in this field. Manufacturers of extraction equipment will be contacted to determine the commercial availability of extraction equipment and to allow initial estimates of potential costs.

SRH will present the results of tasks 1 through 3 to Time Oil Company representatives at Time's offices in Seattle as a part of task 2. This meeting will be conducted to review findings and to refine the scope of work relative to the development of the bench scale study plan.

This task is expected to require 2 weeks for completion with an estimated cost of \$4,316.

#### Task 3 - Evaluate the Nature of the Wastes to be Treated

SRH will determine the porosity, grain size distribution, organic carbon content and other critical parameters of Time's contaminated soil which affect the extraction of PCP and any other identified contaminants from the soil. Analyses performed to date have indicated the presence of unidentified contaminants

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in addition to PCP in the soil at Northwest Terminal. SRH will determine the presence and nature of contaminants other than PCP in the soil to allow determination of their impact on the extraction process. Samples of soil from the Northwest Terminal PCP site will be taken and evaluated for priority pollutants by GC/MS, ICP and other appropriate analytical techniques with identification of other major peaks as indicated. Specifically, soil will be evaluated for grain size (particle size distribution), soil type, porosity, specific gravity, moisture content, pH, total organic carbon and oil and grease levels. Two samples are proposed for each test to allow for an estimation of the range of concentration of the contaminants found.

This task is expected to require 3 weeks for completion (including 2 weeks for laboratory analyses) with an estimated cost of \$6781.

## Task 4 - Develop an Initial Plan for Bench Scale Studies

The information generated in tasks 1 through 3 will be used to refine the experimental approaches needed to complete bench scale studies. The following proposed plan is expected to undergo modification based on those results.

This investigatory plan is based on extraction theory and the existing literature but is heavily weighted towards existing and available technology and equipment. It is intended to quickly produce sufficient results to allow Time to determine if further pursuit of the project is warranted.

Extractability of soil contaminants will be initially evaluated using simple jar tests. Jar tests will be performed by introducing a known amount of contaminated soil into a beaker containing a fixed volume of extracting solution. The material will be agitated for a fixed period of time at a known temperature. Following this protocol, the filtered solution and the extracted soil will be analyzed for PCP and the extraction ratio determined.

Organic solvents, elevated pH solutions and aqueous solutions of surfactants will be evaluated. Up to four solvents, four different pH levels and four different Based on the observed surfactants will be evaluated. environmental relative costs, safety and results, considerations, two different elutriating solutions will be selected for further evaluation, including optimization of The effect of the extraction extraction conditions. procedure on contaminants other than PCP which have been determined to be present in the soil will be assessed by

6

analysis of the extract and the residual soil for these materials. Conditions indicative of a potentially successful soil cleaning process will be pursued for optimization of the batch process. To optimize the process, the extracting conditions will be varied with respect to surfactant concentration, extraction time, temperature and/or pH, as appropriate, to maximize the removal of PCP and other contaminants from the soil. It should be noted that different contaminants may require different extraction solutions (or combinations of solutions). SRH believes that PCP and oil are the principal contaminants and a single extraction solution may be used to remove both substances from Time's soil.

When the batch process has been optimized in the above fashion, samples of the elutriate will be analyzed for all identified contaminants. A description of the elutriate solution will be prepared to allow for evaluation of elutriate treatment alternatives. At this time, it is expected that oxidation or reduction of the waste material represents a potential treatment option but that final selection of a suitable treatment will require a precise understanding of what contaminating materials, other than PCP, may be present.

The optimized solution will be used to compare three extraction procedures, as appropriate, i.e. sequenced batch, countercurrent, and reflux (Soxhlet) extractions. processes can be conducted in SRH's bench scale, laboratory The objective of this set of tests is to optimize the extraction procedure by improving efficiency and minimizing the quantities of solution required. study will necessarily be contingent upon the extraction solutions selected. For example, since caustic and surfactant solutions are not generally volatile, Soxhlet procedures would not be applicable to these solutions and therefore would not be evaluated. Conversely, if an organic solvent is indicated as the elutriating solution, it may be necessary to remove the residual solvent from the extracted soil prior to discharge from the extractor. In this case, sequenced batch extraction may be favored while continuous processes such as countercurrent or soxhlet extraction would be contraindicated.

The last evaluation in the bench scale phase of the project is the determination of a treatment method for the extracted material. Although this evaluation will ultimately depend on the nature of the material as produced, it is believed that oxidation/reduction or separatory methods represent likely candidates. For example, if the extraction is performed using caustic solutions, acidification of the extract to a pH < 5.0 may precipitate significant amounts of

PCP due to the reduced solubility of this compound in its acid form. Conversely, if large amounts of oil are present, it may be necessary to utilize a solvent as the extractant, in which case removal of the solvent and treatment of the residual material through peroxide, permanganate, or other chemical oxidation process, chemical reduction, or physical adsorption onto organic or inorganic substrates may be preferred.

The plan will be developed in close association with Time Oil Co. personnel to ensure that the resultant plan meets Time's expectations and requirements.

This task is expected to require 1 week for completion, with an estimated cost of \$2290.

## Task 5 - Implement Bench Scale Study Plan

SRH will conduct the implementation of the study as planned in task 4, above. The plan, which will have been developed in close coordination with Time Oil Company, will have the following components for the sake of discussion and cost estimation:

- perform 12 initial jar tests
- analyze 24 PCP samples from initial jar tests О
- 0
- perform 6 secondary jar tests analyze 12 PCP samples from secondary jar tests O
- 0
- perform 4 jar tests for optimization analyze 8 PCP samples from optimization jar tests O
- perform 3 process emulating extractions (i.e. soxhlet, 0 countercurrent, etc)
- analyze PCP samples process 6 from extractions
- analyze optimized extract from optimized jar test for all identified contaminants
- perform 4 separatory tests on optimized extract
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- analyze effluent from the above extract destruction tests (9 PCP analyses)
- 0 analyze 1 effluent sample for all identified contaminants

The results of the bench scale study will be a summary report to Time Oil Co. indicating the success or failure of the soil washing process at the bench scale level and projecting the probability for success of a pilot level scale-up.

SRH has evaluated the topic of PCP extraction from soil and is aware that extensive work has already been performed in assessing

the extraction efficiency of this material from soils in an EPA directed extraction procedure for preparing samples for quantitative analysis. This work, done to provide a means for analyzing contaminated soil, has direct bearing on this project, and leads SRH to conclude that reflux extractions may pose a viable and well documented process for PCP contaminated soil remediation. To date, SRH is unaware of any commercial effort to decontaminate soils by this process.

This task is expected to require approximately 12 weeks for completion, including laboratory turn around time. The estimate cost for this task is \$23,680, including analytical costs.

## Task 6 - Prepare Report and Submit Recommendations

SRH will prepare a summary report presenting the data, conclusions and its recommendations to Time Oil Company. The report will include copies of experimental protocols and analytical results and will present a summary of the results and their significance to allow Time Oil Company to determine if further pursuit of this project is warranted. SRH will also attend a one day meeting at Time's offices in Seattle to review the results and conclusions with Time's representatives.

This task is expected to require 1 week for completion with an estimated cost of \$2,626.

## COST ESTIMATE

Although the precise determination of the costs associated with any developmental process is difficult due to the large potential for project reorientation based on new results and findings, SRH believes that the following cost estimates provide a good foundation for project assessment. SRH proposes to perform the work on a time and materials basis according to its current rate schedule. The estimated costs presented herein would not be exceeded without prior authorization from Time.

A detailed cost estimate breakdown is presented in figure 1. SRH suggests that the estimate be reviewed following the completion of tasks 1 - 3, to reflect information obtained during these activities which could impact the assumptions made in estimated tasks 4 through 6. SRH estimates the total bench scale phase costs to be \$37,868 including labor and expenses.

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TASK 2B - MEETING W	TITH TIME OIL CO		
LABOR	PRIN	8.0	\$640.00
	TOTAL	8.0	\$640.00
EXPENSES	MISC.		\$200.00
	TOTAL		\$200.00
TOTAL			\$840.00

	TOTAL TASK	2		\$4,316.00
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	LABOR	SR. SCI CLER CHEM GEOL	16.0 8.0 8.0 8.0	\$1,280.00 \$216.00 \$400.00 \$480.00
		TOTAL	40.0	\$2,376.00
	EXPENSES	MISC. ANALYTICAL TOTAL		\$300.00 \$4,105.50 \$4,405.50
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	LABOR	SR. SCI CLER	24.0 10.0	\$1,920.00 \$270.00
		TOTAL	34.0	\$2,190.00
	EXPENSES	MISC.		\$100.00
		TOTAL		\$100.00
	TOTAL			\$2,290.00
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	LABOR	SR. SCI CLER CHEM GEOL TECH TOTAL	40.0 16.0 72.0 24.0 40.0	\$3,200.00 \$432.00 \$3,600.00 \$1,440.00 \$1,600.00 \$10,272.00
	EXPENSES	MISC. ANALYTICAL COMPUTER OTHER LABORAT		\$350.00 \$9,487.50 \$150.00 \$3,421.25 \$13,408.75
	TOTAL			\$23,680.75

TASK 6 - REPORT AND RECOMMENDATIONS

# TASK 6A - PREPARE REPORT

	LABOR	SR. SCI ADMIN CHEM CLER	8.0 8.0 5.0 8.0	\$640.00 \$480.00 \$250.00 \$216.00
		TOTAL	29.0	\$1,586.00
	EXPENSES	MISC.		\$200.00
		TOTAL		\$200.00
	TOTAL			\$1,786.00
TASK 6B	- MEETING W	ITH TIME OII	L CO	
	LABOR	PRIN	8.0	\$640.00
		TOTAL	8.0	\$640.00
	EXPENSES	MISC.		\$200.00
		TOTAL		\$200.00
	TOTAL			\$840.00
	TOTAL TASK	6		\$2,626.00

# NOTES:

PROJECT TOTAL

REG. SPEC	REGULATORY SPECIALIST
CLER	CLERICAL
SR. SCI	SENIOR SCIENTIST
CHEM	CHEMIST
PRIN	PRINCIPAL
ADMIN	ADMINISTRATIVE ASSISTANT
GEOL	GEOLOGIST

\$42,030.25

#### PROPOSAL AND COST ESTIMATE

BENCH SCALE FEASIBILITY STUDIES
FOR THE
ELUTION OF PCP FROM CONTAMINATED SOIL

**DECEMBER 19, 1986** 

Prepared for:

TIME OIL COMPANY 2737 WEST COMMODORE WAY SEATTLE, WASHINGTON

Prepared by:

SRH ASSOCIATES, INC.
123 NE THIRD AVE, SUITE 230
PORTLAND, OREGON 97232
(503) 232-0824

#### INTRODUCTION

Time Oil Co. has been investigating the nature and extent of soil and groundwater contamination at its Northwest Terminal facility located in Portland, Or. as a result of pentachlorophenol (PCP) releases which occurred at that site over a period of several years. The results of this investigation indicate that the sandy soils to the south of the wood treating chemicals warehouse are contaminated with PCP at concentrations ranging up to several thousand parts per million.

As a result of these findings, Time has performed a preliminary analysis of potential remedial alternatives for the contaminated soils at the site. Due to existing bans on landfilling of the waste (categorized by EPA as listed hazardous waste number F027) and due to Time's expressed interest in preventing further environmental impairment from this site, few alternatives were concluded to be viable. In October of 1986, SRH Associates conducted a review of all available alternatives for the disposal or treatment of Time's PCP contaminated soil. Since this evaluation, the residual soils from the incineration or thermal treatment of F027 contaminated soils have been upheld as being a separately listed hazardous waste (F028), making such thermal processes unsatisfactory remedial alternatives for Time since the resulting soils could not reasonably be expected to be easily delisted from hazardous status.

On the basis of these cumulative findings, no commercially available, licensed process was identified that was capable of treating or disposing of Time's PCP contaminated soils. Several developmental technologies were identified that appeared to have the capability to achieve Time's objectives but which had not been commercialized or demonstrated under conditions found at the Northwest Terminal facility.

On the basis of Time's evaluation of the available remedial alternatives and the above information, a site specific assessment of soil washing technology was recommended. (See Report "Pentachlorophenol Contamination, Northwest Terminal, Section II, pg. 20) Soil washing involves the extraction of wastes from soils using solvents, surfactants or other solutions. The current status of soil washing technology is generally regarded as developmental, however it represents one of the more advanced technologies available to Time in light of the restrictions placed on landfilling, incineration, and closure of the wastes in place. Assessment of this process is consistent with EPA's Research, Development and Demonstration (RD&D) protocols which ultimately require a demonstration to the agency of the effectiveness and limitations of a waste treatment technology prior to its implementation.

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The Northwest Terminal contamination is of such a nature that some degree of demonstration to the regulatory agencies of any cleanup process can be expected to be required prior to the implementation of cleanup efforts. This requirement can be expected due to existing regulations, the extent of contamination at Northwest Terminal, and the potential for the presence of dioxin in the wastes.

The following is a proposed scope of work and cost estimate for a bench scale evaluation of soil washing protocols for application to Time's PCP contaminated soil. The proposal defines the work necessary to review existing literature and to perform bench scale studies to generate data which confirm or reject the assumption that soil washing technologies can successfully clean up Time's contaminated soils. The proposed scope of work does not, at this time, include pilot scale studies, which ordinarily follow bench scale determinations, since it is misleading to attempt to define the scope of work or costs associated with the pilot phase of the project until such time as bench scale results define an appropriate process for scale-up considerations.

# SCOPE OF WORK

#### OVERVIEW

The complete investigation of the feasibility of using soil washing procedures to remediate soils at Time's Northwest Terminal includes the following tasks:

- o Review of existing literature and regulations.
- o Performance of bench scale experiments.
- o Evaluation of bench scale results and execution of a decision to continue or terminate the investigation.
- o Performance of pilot scale experiments.
- o Determination of the economic feasibility of the projected process and execution of a decision to proceed or terminate the investigation.
- o Engineering and design of process equipment, if not commercially available.
- o Fabrication of unavailable equipment and implementation of the process for EPA demonstration and subsequent cleanup activities.

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This proposal addresses only the first phase of the project which includes the first three tasks. Segmenting the project into rational phases with decision points at which to appraise the value of proceeding following completion of each phase, permits stricter control over the project and allows better estimation of the scope of work and costs involved with each phase. The phases may be described as follows:

- o Bench scale studies
- o Pilot scale studies
- o Engineering and Implementation

The detailed scope of work and cost estimate for the bench scale study phase of this project is presented below.

#### BENCH SCALE STUDIES

The bench scale studies are intended to generate sufficient data to allow Time to make an informed decision to proceed with or abandon the project with a minimal amount of capital expended. The tasks associated with this phase are designed to evaluate three different soil washing procedures, to define the parameters associated with their use, to characterize the soil chemistry and the spectrum of contaminants in the PCP contaminated soil at Time's Northwest Terminal facility, to select the most effective soil washing procedure based on bench study results, to define the nature of the recovered elutriate solution generated during soil washing, and to assess methods for destruction of the contaminants found in that elutriate. The following is a detailed task breakdown to accomplish these objectives.

## Task 1 - Review Current Regulations

To reduce the risk of new regulations or new interpretations of existing regulations unfavorably impacting this study, SRH will appraise the status of regulations affecting soil washing technology. These evaluations are necessary to prevent the expenditure of time investigating technologies which are generally regarded as unpermittable and to preclude the potential for regulatory violations and fines. Perhaps the most functional purpose of this task is to provide Time with both regulatory and political data to properly prepare submittals to EPA and DEQ in order to expedite acceptance of plans, permits and other communications.

EPA representatives from Region X, Waste Management Branch, Hazardous Waste Division, Seattle; EPA Headquarters, Office of Solid Waste, Washington, D.C.; and the Office of Research and

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Development (ORD), Cincinnati, OH., will be queried regarding the current and pending status of regulations regarding PCP treatment technologies. SRH proposes to solicit and evaluate the information received from these agencies in a confidential manner to allow Time Oil Co. access to unbiased information and to develop strategies which are expeditious due to their regulatory and political acceptability. Emphasis will be placed on extraction procedures. Particular effort will be placed on discussions with representatives from the Alternative Treatment Technologies Section of ORD to not only review the regulations associated with extraction of PCP contaminated soils, but to also determine the status of research being performed by EPA in this area.

This task is expected to require 2 weeks for completion with an estimated cost of \$2,336.

# Task 2 - Review Current Extraction Literature

SRH will review existing extraction technology by examining literature in the fields of hazardous waste extraction, food processing technology (specifically edible oils) and metal recovery and mining (ore leaching). In addition to the discussions with ORD described under task 1, EPA's list of internal publications will be reviewed to identify, obtain copies of, and subsequently review EPA literature in this field. General extraction theory will be reviewed using current texts. U.S. patent literature will be reviewed to appraise the status of engineering in this field. Manufacturers of extraction equipment will be contacted to determine the commercial availability of extraction equipment and to allow initial estimates of potential costs.

SRH will present the results of tasks 1 through 3 to Time Oil Company representatives at Time's offices in Seattle as a part of task 2. This meeting will be conducted to review findings and to refine the scope of work relative to the development of the bench scale study plan.

This task is expected to require 2 weeks for completion with an estimated cost of \$4,316.

## Task 3 - Evaluate the Nature of the Wastes to be Treated

SRH will determine the porosity, grain size distribution, organic carbon content and other critical parameters of Time's contaminated soil which affect the extraction of PCP and any other identified contaminants from the soil. Analyses performed to date have indicated the presence of unidentified contaminants

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in addition to PCP in the soil at Northwest Terminal. SRH will determine the presence and nature of contaminants other than PCP in the soil to allow determination of their impact on the extraction process. Samples of soil from the Northwest Terminal PCP site will be taken and evaluated for priority pollutants by GC/MS, ICP and other appropriate analytical techniques with identification of other major peaks as indicated. Specifically, soil will be evaluated for grain size (particle size distribution), soil type, porosity, specific gravity, moisture content, pH, total organic carbon and oil and grease levels. Two samples are proposed for each test to allow for an estimation of the range of concentration of the contaminants found.

This task is expected to require 3 weeks for completion (including 2 weeks for laboratory analyses) with an estimated cost of \$6781.

# Task 4 - Develop an Initial Plan for Bench Scale Studies

The information generated in tasks 1 through 3 will be used to refine the experimental approaches needed to complete bench scale studies. The following proposed plan is expected to undergo modification based on those results.

This investigatory plan is based on extraction theory and the existing literature but is heavily weighted towards existing and available technology and equipment. It is intended to quickly produce sufficient results to allow Time to determine if further pursuit of the project is warranted.

Extractability of soil contaminants will be initially evaluated using simple jar tests. Jar tests will be performed by introducing a known amount of contaminated soil into a beaker containing a fixed volume of extracting solution. The material will be agitated for a fixed period of time at a known temperature. Following this protocol, the filtered solution and the extracted soil will be analyzed for PCP and the extraction ratio determined.

elevated pH solutions and aqueous Organic solvents, solutions of surfactants will be evaluated. Up to four solvents, four different pH levels and four different surfactants will be evaluated. Based on the observed relative costs, safety and environmental results, considerations, two different elutriating solutions will be selected for further evaluation, including optimization of The effect of the extraction extraction conditions. procedure on contaminants other than PCP which have been determined to be present in the soil will be assessed by

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analysis of the extract and the residual soil for these Conditions indicative materials. of a potentially successful soil cleaning process will be pursued for optimization of the batch process. To optimize the process, the extracting conditions will be varied with respect to surfactant concentration, extraction time, temperature and/or pH, as appropriate, to maximize the removal of PCP and other contaminants from the soil. It should be noted that different contaminants may require different extraction solutions (or combinations of solutions). SRH believes that PCP and oil are the principal contaminants and a single extraction solution may be used to remove both substances from Time's soil.

When the batch process has been optimized in the above fashion, samples of the elutriate will be analyzed for all identified contaminants. A description of the elutriate solution will be prepared to allow for evaluation of elutriate treatment alternatives. At this time, it is expected that oxidation or reduction of the waste material represents a potential treatment option but that final selection of a suitable treatment will require a precise understanding of what contaminating materials, other than PCP, may be present.

The optimized solution will be used to compare extraction procedures, as appropriate, i.e. sequenced batch, countercurrent, and reflux (Soxhlet) extractions. processes can be conducted in SRH's bench scale, laboratory The objective of this set of tests is to apparatus. optimize the extraction procedure by improving efficiency and minimizing the quantities of solution required. This study will necessarily be contingent upon the extraction For example, since caustic solutions selected. surfactant solutions are not generally volatile, Soxhlet procedures would not be applicable to these solutions and therefore would not be evaluated. Conversely, if an organic solvent is indicated as the elutriating solution, it may be necessary to remove the residual solvent from the extracted soil prior to discharge from the extractor. In this case, sequenced batch extraction may be favored while continuous processes such as countercurrent or soxhlet extraction would be contraindicated.

The last evaluation in the bench scale phase of the project is the determination of a treatment method for the extracted material. Although this evaluation will ultimately depend on the nature of the material as produced, it is believed that oxidation/reduction or separatory methods represent likely candidates. For example, if the extraction is performed using caustic solutions, acidification of the extract to a pH < 5.0 may precipitate significant amounts of

PCP due to the reduced solubility of this compound in its acid form. Conversely, if large amounts of oil are present, it may be necessary to utilize a solvent as the extractant, in which case removal of the solvent and treatment of the residual material through peroxide, permanganate, or other chemical oxidation process, chemical reduction, or physical adsorption onto organic or inorganic substrates may be preferred.

The plan will be developed in close association with Time Oil Co. personnel to ensure that the resultant plan meets Time's expectations and requirements.

This task is expected to require 1 week for completion, with an estimated cost of \$2290.

# Task 5 - Implement Bench Scale Study Plan

SRH will conduct the implementation of the study as planned in task 4, above. The plan, which will have been developed in close coordination with Time Oil Company, will have the following components for the sake of discussion and cost estimation:

- o perform 12 initial jar tests
- o analyze 24 PCP samples from initial jar tests
- o perform 6 secondary jar tests
- o analyze 12 PCP samples from secondary jar tests
- o perform 4 jar tests for optimization
- o analyze 8 PCP samples from optimization jar tests
- o perform 3 process emulating extractions (i.e. soxhlet, countercurrent, etc)
- o analyze 6 PCP samples from process emulating extractions
- o analyze optimized extract from optimized jar test for all identified contaminants
- o perform 4 separatory tests on optimized extract
- o perform 3 oxidation tests on optimized extract
- o perform 2 reduction tests on optimized extract
- o analyze effluent from the above extract destruction tests (9 PCP analyses)
- o analyze 1 effluent sample for all identified contaminants

The results of the bench scale study will be a summary report to Time Oil Co. indicating the success or failure of the soil washing process at the bench scale level and projecting the probability for success of a pilot level scale-up.

SRH has evaluated the topic of PCP extraction from soil and is aware that extensive work has already been performed in assessing

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the extraction efficiency of this material from soils in an EPA directed extraction procedure for preparing samples for quantitative analysis. This work, done to provide a means for analyzing contaminated soil, has direct bearing on this project, and leads SRH to conclude that reflux extractions may pose a viable and well documented process for PCP contaminated soil remediation. To date, SRH is unaware of any commercial effort to decontaminate soils by this process.

This task is expected to require approximately 12 weeks for completion, including laboratory turn around time. The estimate cost for this task is \$23,680, including analytical costs.

# Task 6 - Prepare Report and Submit Recommendations

SRH will prepare a summary report presenting the data, conclusions and its recommendations to Time Oil Company. The report will include copies of experimental protocols and analytical results and will present a summary of the results and their significance to allow Time Oil Company to determine if further pursuit of this project is warranted. SRH will also attend a one day meeting at Time's offices in Seattle to review the results and conclusions with Time's representatives.

This task is expected to require 1 week for completion with an estimated cost of \$2,626.

#### COST ESTIMATE

Although the precise determination of the costs associated with any developmental process is difficult due to the large potential for project reorientation based on new results and findings, SRH believes that the following cost estimates provide a good foundation for project assessment. SRH proposes to perform the work on a time and materials basis according to its current rate schedule. The estimated costs presented herein would not be exceeded without prior authorization from Time.

A detailed cost estimate breakdown is presented in figure 1. SRH suggests that the estimate be reviewed following the completion of tasks 1 - 3, to reflect information obtained during these activities which could impact the assumptions made in estimated tasks 4 through 6. SRH estimates the total bench scale phase costs to be \$37,868 including labor and expenses.

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TABLE 1 - COST ESTIMATE DETAIL

TASK	PERSONNEL	HOURS	COST		
TASK 1 - REVIEW CUR	RENT REGULATION	s			
LABOR	REG. SPEC. CLER	24.0 8.0	\$1,920.00 \$216.00		
	TOTAL	32.0	\$2,136.00		
EXPENSES	MISC.		\$200.00		
	TOTAL		\$200.00		
TOTAL	•		\$2,336.00		
TASK 2 - REVIEW CURRENT EXTRACTION LITERATURE TASK 2A - REVIEW LITERATURE					
LABOR	SR. SCI CLER CHEM	32.0 8.0 10.0	\$2,560.00 \$216.00 \$500.00		
	TOTAL	50.0	\$3,276.00		
EXPENSES	MISC.		\$200.00		
	TOTAL		\$200.00		
TOTAL			\$3,476.00		
TASK 2B - MEETING W	ITH TIME OIL CO				
LABOR	PRIN	8.0	\$640.00		
	TOTAL	8.0	\$640.00		
EXPENSES	MISC.		\$200.00		
	TOTAL		\$200.00		
TOTAL			\$840.00		

	TOTAL TASK	2		\$4,316.00
TASK 3 -	EVALUATE N	ATURE OF WAS	TES	
	LABOR	SR. SCI CLER CHEM GEOL	16.0 8.0 8.0 8.0	\$1,280.00 \$216.00 \$400.00 \$480.00
		TOTAL	40.0	\$2,376.00
	EXPENSES	MISC. ANALYTICAL TOTAL		\$300.00 \$4,105.50 \$4,405.50
	TOTAL			\$6,781.50
TASK 4 -	DEVELOP ST	UDY PLAN		
	LABOR	SR. SCI CLER	24.0 10.0	\$1,920.00 \$270.00
		TOTAL	34.0	\$2,190.00
	EXPENSES	MISC.		\$100.00
		TOTAL		\$100.00
	TOTAL			\$2,290.00
TASK 5 -	IMPLEMENT	BENCH SCALE	STUDY	
	LABOR	SR. SCI CLER CHEM GEOL TECH	40.0 16.0 72.0 24.0 40.0	\$3,200.00 \$432.00 \$3,600.00 \$1,440.00 \$1,600.00 \$10,272.00
	EXPENSES	MISC. ANALYTICAL COMPUTER OTHER LABOR TOTAL	ATORY	\$350.00 \$9,487.50 \$150.00 \$3,421.25 \$13,408.75
	TOTAL			\$23,680.75

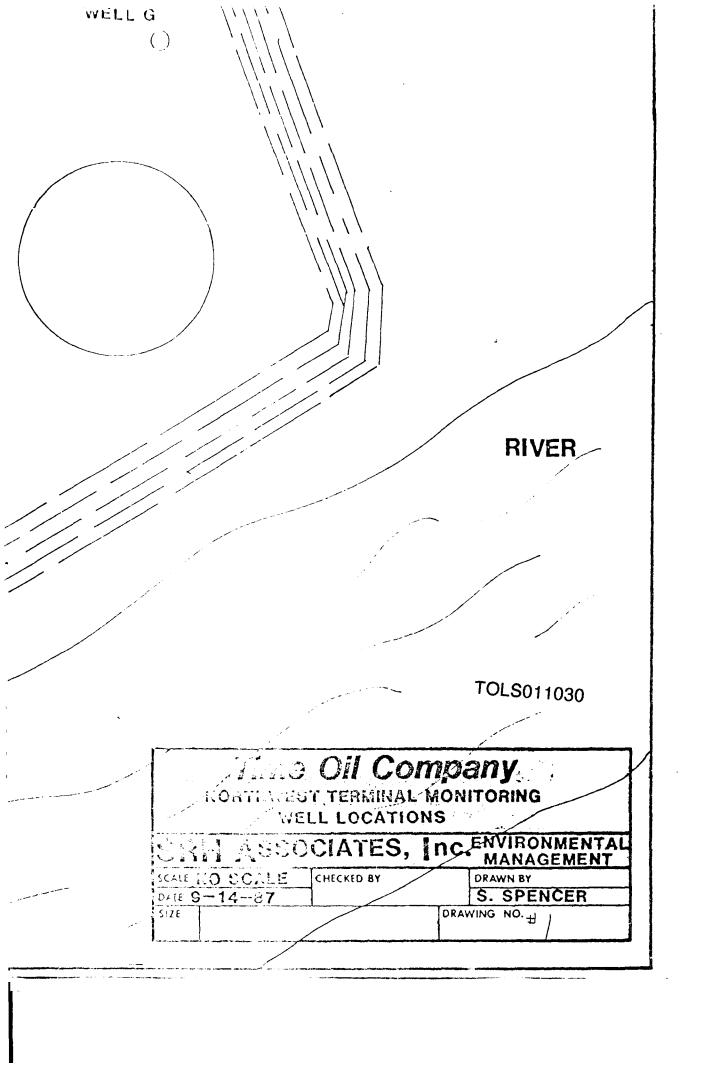
TASK 6 - REPORT AND RECOMMENDATIONS

## TASK 6A - PREPARE REPORT

	LABOR	SR. SCI	8.0	\$640.00
		ADMIN	8.0	\$480.00
		CHEM	5.0	\$250.00
		CLER	8.0	\$216.00
		TOTAL	29.0	\$1,586.00
	EXPENSES	MISC.		\$200.00
		TOTAL		\$200.00
	TOTAL			\$1,786.00
TASK 6B	- MEETING W	ITH TIME OIL	со	
	LABOR	PRIN	8.0	\$640.00
		TOTAL	8.0	\$640.00
	EXPENSES	MISC.		\$200.00
		TOTAL		\$200.00
	TOTAL			\$840.00
	TOTAL TASK	6		\$2,626.00
				•
PROJECT	TOTAL			\$42,030.25

## NOTES:

REG. SPEC	REGULATORY SPECIALIST
CLER	CLERICAL
SR. SCI	SENIOR SCIENTIST
CHEM	CHEMIST
PRIN	PRINCIPAL
ADMIN	ADMINISTRATIVE ASSISTANT
GEOL	GEOLOGIST



# GROUNDWATER MONITORING AT TIME OIL COMPANY

Northwest Terminal Portland, Oregon

SRH ASSOCIATES, INC.

123 NE THIRD AVE.

PORTLAND, OREGON

## GROUNDWATER MONITORING

ΑT

TIME OIL COMPANY

NORTHWEST TERMINAL

PORTLAND, OREGON

November 5, 1987

Prepared For:

Time Oil Company 2737 West Commodore Way Seattle, Washington

Prepared By:

SRH Associates, Inc. 123 NE Third Ave. Suite 230 Portland, Oregon 97232 (503) 232-0824

#### INTRODUCTION

SRH Associates collected groundwater samples on August 20 and October 16, 1987, from Time Oil Co.'s Northwest Terminal Facility located in Portland, Oregon. The samples were analyzed for pentachlorophenol (PCP) in an effort to further existing data concerning past releases of this chemical from a wood treating chemicals formulating operation at this site.

The groundwater was sampled at nine existing monitoring wells surrounding the wood treating chemicals area and was analyzed for PCP and pH. Static water levels were determined in these wells and at a monitoring station for the measurement of Willamette River water elevations located on the Northwest Terminal facility's unloading pier.

### GROUNDWATER SAMPLING

Nine vertical groundwater monitoring points at Time were measured for static water levels and tested for pH and PCP. The wells had been previously installed by Time employees or other contractors and consisted of 2 inch and 1 1/4 inch (I.D.) PVC screen or stainless steel drive points and PVC casing.

The water level elevations in the wells were measured to the nearest 0.01 foot from the top edge of the casing at a scribed mark located on the north side of the casing. A Fisher M-Scope previously calibrated against a steel tape was used to obtain the measurements. Standing bore volumes of well water were calculated based on these measurements and construction drawings provided by Time. A measurement of the Willamette River water elevation relative to a mark located by Time on its unloading pier was also taken.

Stainless steel weighted bailers were used to remove at least 4 standing bore volumes of water prior to collecting representative samples of groundwater. The bailers had been previously cleaned with sequential washings of laboratory detergent, tap water, hexane, tap water, trisodium phosphate and sodium carbonate in water, tap water, and distilled water (3X). The bailers were recleaned after each well was sampled and new, clean strings were attached. The purged water was collected into D.O.T. 17 E drums until proper disposal could be determined based on analytical results.

The samples were dispensed directly from the bailer into two 1 liter amber glass bottles fitted with screw cap closures and teflon liners for PCP analysis. Samples were adjusted to pH 2 with 1:1 Sulfuric Acid in distilled water and checked with pH paper prior to refrigeration and delivery to the lab. Samples for pH analyses were dispensed directly into 250 ml polyethylene wide mouthed bottles without preservatives. All samples were logged, labelled, sealed and transferred to the laboratory within 6 hours of collection.

pH analyses were performed within 2 hours of sample collection using a silver - silver chloride reference electrode standardized against two NBS traceable reference buffer solutions. PCP analyses were performed by first extracting the samples in the laboratory using method 3510, Separatory Funnel Liquid - Liquid Extraction, as described in EPA publication SW 846. The extract was then analyzed for PCP by method 8040, Phenols, as described in EPA publication SW 846. Field duplicates and laboratory and field blanks were analyzed. All quality control results indicated acceptable performance of sampling and analysis.

## SAMPLE ANALYSIS

On August 20, a PCP concentration of 2300 ppb was detected in Well B. Well B was re-sampled on October 16 at which time a concentration of 1000 ppb was detected. No contamination has been observed in Wells A, D, F, H, and I. Wells C, E, and G were dry and could not be sampled. The locations of the wells are shown in Figure 1. The results of the groundwater investigation are summarized in Table 1.

#### RECOMMENDATIONS

- Define the rate and extent of contaminated groundwater migration by drilling 2 - 4 lateral downgradient wells near Well B.
- Pursue the remediation plan outlined in our October 1, 1986 correspondence to you. This plan included:
  - a) Selecting the "Surface Mounted Soil Washing" technique as the most logical remedial plan.
  - b) Performing bench scale and pilot level evaluations.
  - c) Determining necessary destruction steps of recovered extracts.
  - d) Ascertaining technical permitting and economic feasibility of technique for final disposal action.

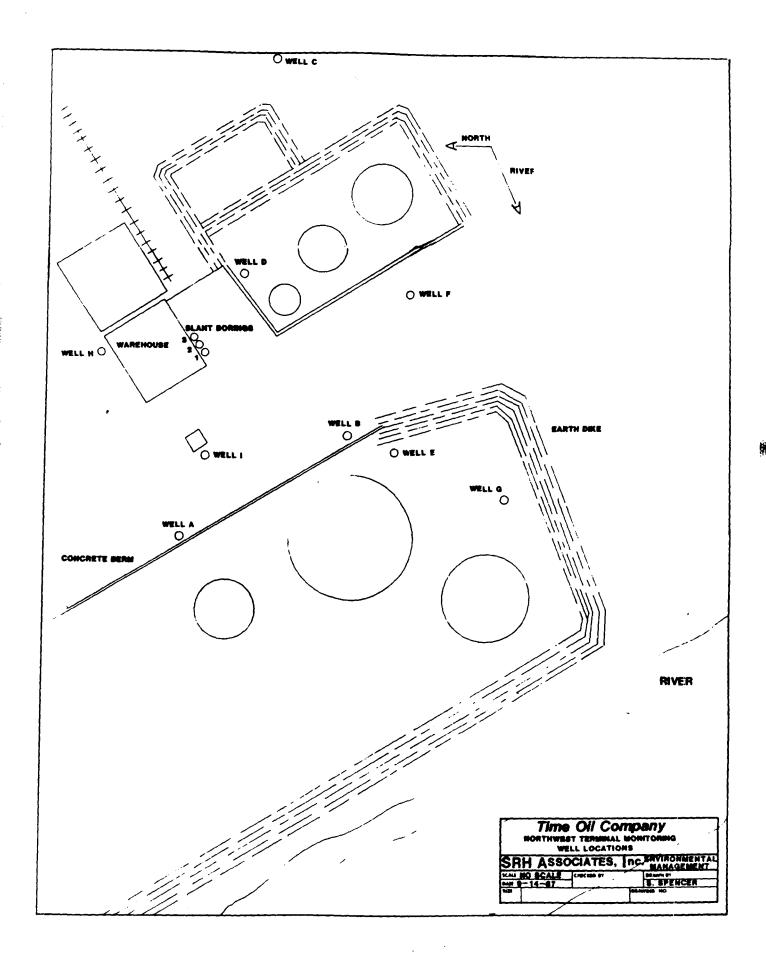
- e) Comparing results with repeat step by step examination of next most logical remedial approaches which are: "Surface Mounted Thermal Extraction" and "In-Situ Thermal Extraction".
- Evaluate the vertical gradient of groundwater flux in an uncontaminated zone immediately adjacent to the soil pile by installing one well cluster with multiple completion depths.

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TABLE 1 - GROUNDWATER SAMPLE RESULTS

Sample	<u>ug/l</u> (1)	PCP (2)	Нд	Depth <u>Water</u>		Water	atic Level MSL) ** (2)
MW-A	<20	NA	6.61	13.78	14.74	83.36	82.40
MW-B	2300	1000	6.57	14.79	15.54	82.04	81.29
MW-C				(Dr	cy)		
MW-D	<20	NA	6.60	14.29	15.24	83.64	82.69
MW-E				(Dr	<b>-</b> Y)		
MW-F	<20	NA	6.43	15.27	16.02	82.70	81.95
MW-G				(Dı	<b>-</b> Y)		
MW-H	<20	NA	6.64	13.78	12.10	83.71	82.65
MW-I	<20	NA	6.38	14.57	15.23	83.43	82.77
River				25.67	24.67		

- (1) As measured on 8/20/87
- (2) As measured on 10/16/87
- \* Distance from well stickup (or pier reference point) to water.
- \*\* Relative to TBM established by TOC
- NA = Not Analyzed



TOLS011037

## APPENDIX A - LAB DATA



## **COFFEY LABORATORIES, INC.**

4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

August 31, 1987 Log# A873829-AF1-6 PO# Hone Civen

SRN Associates 123 NE 3rd, Suite 230 Portland, OR 97232 Attention: John Ruddick

Sample Received: 8-20-97

Sample Collected: 8-20-87

Sample Collected/Delivered by: Client

Analysis Requested: pt. Phenols

#### Results:

ANALYSIS	Λ−W1	MV-Z	iM-D	M' I-D2
рН	6.61	7.08	6.60	6.65

ANALYSIS	IM-F	MI-B
рH	6.43	6.57

Results in S.U.

REPORT CONTINUES

## COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave. Portland, OR 97230 Phone: (503) 254-1794

> September 1, 1987 Log 5 A878823-AJ1-2 PG # MONE GIVEN

SRH Associates 123 NL 3rd, Suite 233 Portland, Or 97232 Attention: John Ruddick

Sample Received: 8-20-37

Sample Collected: 3-20-87

Sample Collected by: Steve Spencer

Analysis Requested: pl'

Results

ANALYSIS TIME MU H TIME WU I

DH 6.64 6.30

Results in S.U.

REPORT CONTINUES



September 1, 1987 Log #A870820-AJ1-2 PO # NONE GIVEN PAGE 2

SRH Associates

123 NE 3rd, Suite 23"
Portland, Or 97232
Attention: John Ruddick

Sample Received: 8-20-87

Sample Collected: 8-20-37

Sample Collected by: Steve Spencer

Analysis Requested: Phenols by EPA Method 8840, Capillary GC/FID

ANALYTE	TIME MW H	TIME MW I
com uno depr más gais quis quis		
4-Chloro-3-methylphenol	< 10	< 10
2-Chlorophenol	< 10	< 10
2,4-Dichlorophenol	< 10	< 10
2,4-Dimethylphenol	< 1ß	< 10
2,4-Dinitrophenol	< 5g	< 5¤
2-Methyl-4,6-dinitrophenol	< 20	< 2∑
2-Nitrophenol	< 10	< 10
4-Nitrophenol	< 20	< 22
Pentachlorophenol	< 2⊙	< 2ົົວ
Phenol	< 10	< 10
2,4,6-Trichlorophenol	< 10	< 10
2,3,4,5-Tetrachlorophenol *	< 1Ø	< 10
2,3,4,6-Tetrachlorophenol *	< 10	< 10

Results in ug/L

\* Not included in EPA 604/8042

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Approved,

Swan M. Brillante

Susan M. Brillante,

Manager, Organic Laboratory

Sincerely,

Susan M. Coffey.

President

SMC/gle

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

August 31, 1937 Log #A070020-AF1-6 PC # NOHO GIVEN PAGE 2

SPM Associates 123 ME 3rd, Suite 237 Portland, Or 97232 Attention: John Ruddick

Sample Received: 8-29-97

Sample Collected: 8-20-87

Sample Collected by: John Ruddick

Analysis Requested: Phenols by EPA Method 8040, Capillary GC/FID

AMALYTH	MVI−P. ✓	MW-Z /
4-Chloro-3-methylphenol	< 1@	< 13
2-Chlorophenol	< 10	< 10
2,4-Dichlorophenol	< 10	< 13
2,4-Dimethylphenol	< 10	< 10
2,4-Dinitrophenol	< 5Ø	< 50
2-Methyl-4,6-dinitrophenol	< 20	< 2ß
2-Nitrophenol	< 10	< 10
4-Nitrophenol	< 20	< 2₽
Pentachlorophenol	< 20	< 20
Phenol	< 10	< 1C
2,4,6-Trichlorophenol	< 10	< 10
2,3,4,6-Tetrachlorophenol *	< 15	< 15
2,3,5,6-Tetrachlorophenol *	< 15	< 15

Results in ug/L

\* Not included in EPA 604/8040

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

REPORT CONTINUES

TOLS011042

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**COFFEY LABORATORIES, INC.** 

RECEIVED SEP 0 8 198"

4914 N.E. 122nd Ave. Portland, OR 97230 Phone: (503) 254-1794

> August 31, 1987 Log WA875020-AF1-6 PO # HOUR GIVE PAGE 4

SRH Associates

123 MW 3rd, Suite 233 Portland, Or 97232

Attention: John Ruddick

Sample Received: 8-20-87

Sample Collected: 8-20-37

Sample Collected by: John Ruddick

Analysis Requested: Phenols by EPA "cthod 8040, Capillary GC/FID

AMALYTI	:17-F	:Ni-B	BLANK
4-Chloro-3-methylphenol	< 10	< 166	< 10
2-Chlorophenol	< 10	< 105	< 10
2,4-Dichlorophenol	< 10	< 100	< 10
2,4-Dimethylphenol	< 10	<. 100	< 10
2,4-Dinitrophenol	< 50	< 50€	< 5Ø
2-Methyl-4,6-dinitrophenol	< 20	< 20°3	< 20
2-Nitrophenol	< 10	< 10 j	< 10
4-Mitrophenol	< 2₫	< 200	< 20
Pentachlorophenol	< 28	2370	< 2₫
Phenol	< 13	< 100	< 1¢
2,4,6-Trichlorophenol	< 10	< 100	< 10
2,3,4,6-Tetrachlorophenol *	< 15	173	< 15
2,3,5,6-Tetrachlorophenol *	< 15	100	< 15

Results in ug/L

Not included in EPA 694/8940

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Approved,

Susan 11. Brillante,

Manager, Organic Laboratory

Sincerely,

President

SEC/gle

TOLS011043

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.



## **COFFEY LABORATORIES, INC.**

4914 N.E. 122nd Ave. Portland, OR 97230 Phone: (503) 254-1794

> August 31, 1987 Log #A870923-AF1-6 PC # MONE GIVEN PAGY 3

SRM Associates 123 ME 3rd, Suite 230 Portland, Or 97232 Attention: John Ruddick

Sample Received: 8-20-87

Sample Collected: 8-23-57

Sample Collected by: John Ruddick

Analysis Requested: Phenols by DPA Method 8846, Capillary GC/FID

ANALYTE	1411-0	MM-D2 v
4-Chloro-3-methylphenol	< 10	< 10
2-Chlorophenol	< 10	< 1g
2,4-Dichlorophenol	< 10	< 12
2,4-Dimethylphenol	< 10	< 1♂
2,4-Dinitrophenol	< 5∅	< 50°
2-Methyl-4,6-dinitrophenol	< 20	< 23
2-Nitrophenol	< 18	< 10
4-Nitrophenol	< 2€	< 2 €
Pentachlorophenol	< 2⊍	< 20
Phenol	< 16	< 16
2,4,6-Trichlorophenol	< 10	< 10
2,3,4,6-Tetrachlorophenol *	<b>&lt;</b> 15	< 15
2,3,5,6-Tetrachlorophenol *	<b>&lt;</b> 15	< 15

Results in ug/L

\* Not included in EPA 604/8040

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

EDPORT CONTINUES

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10 Le	Test One Phase Only  Mix All Phases By Shating  Bry Saeple and Yest Nesidue  If we need core into on how  Time Mw A  Time Mw D  Time Mw D  Time Mw D  Time Mw D  Time Mw F	Date   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO	Continue Time ARR ARR ARR ARR ARR ARR ARR ARR ARR AR	AIN nuatic	ar unho OF on Sh	y San should CU aet is	ple First d me call? USTODY s on the I	INFORMATIC ackside of this for equested	Ter flix Pho (N (ra)	st Filtrate enly Sample by Shakin	1
10 Le	Test One Phase Only  Mix All Phases By Shating  Bry Saeple and Yest Nesidue  If we need core into on how  Time Mw A  Time Mw D  Time Mw D  Time Mw D  Time Mw D  Time Mw F	Date   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO	Continue Time ARR ARR ARR ARR ARR ARR ARR ARR ARR AR	AIN nuation Media	ar unho OF on Sh	y San should CU aet is	ple First d me call? USTODY s on the I	INFORMATIC ackside of this for equested	Ter flix Pho (N (ra)	st Filtrate enly Sample by Shakin	
3	Test One Phase Only  Mix All Phases By Shating  Bry Saeple and Yest Nesidue  If we need core into on how  Time Mw A  Time Mw D  Time Mw D  Time Mw D  Time Mw D  Time Mw F	Date   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO   SZO	Continue Time ARR ARR ARR ARR ARR ARR ARR ARR ARR AR	AIN nuation Media	ar unho OF on Sh	y San should CU aet is	ple First d me call? USTODY s on the I	INFORMATIC ackside of this for equested	Ter flix Pho (N (ra)	st Filtrate enly Sample by Shakin	

## COFFE 4914

## COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

October 24, 1987 Log#A871016-O PO#None

SRH Associates, Inc. 123 NE Third, Suite 230 Portland, OR 9724 Attention: John Ruddick

Sample Received: 10-16-87

Sample Collected: 10-16-87

Sample Delivered by: Client

Analysis Requested: Pentachlorophenol

SAMPLE ID

RESULTS

UNITS

1003-1016-B

1.0

mg/L

Analysis by EPA Method 604 capillary GC/FID

Sincerely,

**S**...

Susan M. Coffey N

President

SMC/gle

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

ADORE 31 LYZ 31 LL1	1616 5RH ASS 158 123 NE 3 15141E//IF Port		15					794	
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		land	OR	) 	972	32LAH	PRICE U	NOTE #	
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## SRH ASSOCIATES, INC ENVIRONMENTAL MANAGEMENT

TO:

TIME OIL COMPANY
PO Box 24447
Terminal Station
Seattle, WA 98124-0447
Attn: John Denham

November 9, 1987 #40147 In reference to:

In reference to: Groundwater Investigation

	HOURS	AMOUNT
-Prof. Services	13.25	905.00
TOTAL PROFESSIONAL SERVICES:	13.25	\$905.00
Expense Charges: -Mileage		20.65
-Supplies		3.07
-Lab Analysis		103.50
TOTAL EXPENSE CHARGES:		\$127.22
TOTAL CHARGES		\$1,032.22
Previous Balance		\$1,778.31
BALANCE DUE		\$2,810.53

Current	1 Month	2 Month	3 Month
1,032.22	1.778.31	0.00	0.00

123 NE THIRD AVE.

PORTLAND, OR 97232

(503) 232-0824

Date 11/09/87 Time 10:24 am

## SRH ASSOCIATES, INC. DETAIL OF CHARGES

Page 1

through	Description	Accum hrs	Rate	Billable \$
Client -	1003-2 Time Oil			
10/16/87	SAMPLING	3.00	80.00	240.00
10/16/87	MOBILIZATION	1.00	80.00	80.00
10/16/87	MOBILIZATION/DEMOBILIZATION	2.00	60.00	120.00
10/16/87	SAMPLING TO LAB	0.50	60.00	30.00
10/16/87	SAMPLING	3.75	60.00	225.00
10/16/87	SUMMARY OF SAMPLING	1.50	60.00	90.00
10/19/87	REPORT	1.50	80.00	120.00
Subtotal	for Prof. Services	13.25		905.00
10/22/87	LAB ANALYSIS	0.00	0.00	103.50
Subtotal	for \$Lab Analysis	0.00		103.50
10/16/87	MILEAGE	0.00	0.00	20.65
Subtotal	for \$Mileage	0.00		20.65
10/16/87	SUPPLIES		0.00	
Subtotal	for \$Supplies			
Subtotal	for 1003-2 Time Oil	0.00		3.07
		13.25		1032.22

## SRH Associates, Inc. environmental management

## TO:

TIME OIL COMPANY
PO Box 24447
Terminal Station
Seattle, WA 98124-0447
Attn: John Denham

October 12, 1987 #40131		
In reference to: Portland Feasibility	Study HOURS	AMOUNT
-Prof. Services	22.00	882.50
TOTAL PROFESSIONAL SERVICES:	22.00	\$882.50
Expense Charges:		
-Copies		2.30
-Long Distance		1.00
-Mileage		15.40
-Printing		3.11
-Lab Analysis		874.00
TOTAL EXPENSE CHARGES:		\$895.81
TOTAL CHARGES		\$1,778.31
BALANCE DUE		\$1,778.31

TOLS011050

123 NE THIRD AVE.

PORTLAND, OR 97232

(503) 232-0824

Date 10/12/87 Time 2:49 pm

## SRH ASSOCIATES, INC. DETAIL OF CHARGES

Page 7

	•			•
through	Description	Accum hrs	Rate	Billable \$
Client -	1028 TOC-Port			
08/17/87	SET UP PORTLAND	0.50	80.00	40.00
08/20/87	SET UP PORTLAND	1.50	80.00	120.00
08/20/87	TAKE SAMPLES AND DELIVER TO LAB	6.50	25.00	162.50
08/24/87	FINISH REPORT AND FILL LOG BOOK	1.50	25.00	37.50
09/08/87	RESULTS	1.50	80.00	120.00
09/11/87	WORK ON DRAFT	2.50	25.00	62.50
09/15/87	COMPLETE DRAFT OF PROPERTY	3.00	25.00	75.00
09/15/87	PICK UP DRAFT SUPPLIES	1.00	25.00	25.00
09/15/87	QUARTER REPORT	4.00	60.00	240.00
Subtotal	for Prof. Services	22.00		992 50
00/10/07	CONTEG	22.00		882.50
09/19/87	COPIES	0.00	0.00	2.30
Subtotal	for \$Copies	0.00		2.30
09/09/97	LAB ANALYSIS		0.00	
	LAB ANALYSIS		0.00	
09/09/67	LAB ANALISIS	0.00	0.00	033.30
Subtotal	for \$Lab Analysis	0.00		874.00
09/09/87	LONG DISTANCE CHARGES	0.00	0.00	1.00
Subtotal	for \$Long Distance			
_ 3		0.00		1.00
08/20/87	MILEAGE	0.00	0.00	14.00

Date 10/12/87 Time 2:49 pm SRH ASSOCIATES, INC. DETAIL OF CHARGES

Page 8

through	Description	Accum hrs	Rate	Billable \$
	1028 TOC-Port			
09/15/87		0.00	0.00	1.40
Subtotal	for \$Mileage			
	· · ·	0.00		15.40
09/24/87	PRINTING	0.00	0.00	3.11
Subtotal	for \$Printing	0.00		3.11
Subtotal	for 1028 TOC-Port			
		22.00		1778.31

# TIME OIL CO. P.O. Box 24447 Terminal Annex Seattle, WA 98124

TO: SRH	Associates,	Inc.	· · · · · · · · · · · · · · · · · · ·	WORK ORDI	ER
P.O.	Box 14005		PLACE THE	NO. 2 S NUMBER ON	YOUR INVOICE
	land, OR 9		*	DRRESPONDEN	
Attn	: John Rudd:	ick			
		is checked, this work or you are authorized to pe			
		is checked, this work or	der is not an	addendum to	o anv established
contract	. You are	authorized to perform th	e following w	ork at the	stated price(s).
ADDRESS:	(Show stree	t address and city of jo	ob site)		PROPERTY NO.:
12005 N	orth Burgard	d, Portland OR			03-123
REQUESTED	BY:	AUTHORIZED BY: DA	TE JOB REQUIR	ED:   INSPECT	ION REQUIRED:
Fred Pr	oby	112	A.S.A.P.	B	Υ
This wor	k order is	expense of: $ \overline{x} $ TOC	OTHER		TAXABLE
QUANTITY	. •	DESCRIPT	ION		AMOUNT
	Measure wa	ater level in Northwest	Terminal monit	oring	
	wells "A"	through "H" and at rive	r.		
	Collect wa	ater sample from monitor	ing well "B" a	ınd	
	analyze fo	or pentachlorophenol and	pH.		:
-,-,-			<del></del>		١
		Time and	Materials Not	To Exceed	\$ 750.00
					*
<del></del>			<del></del>		
		<u> </u>			
<del></del>			<del></del>		
	·				
<del></del>					
	ESCRIPTION: west Termina	al woodtreating cleanup.		TOLS	8011053
TIME OIL	CO. (SIGNATI	JRE):		DATE: 10/19	1/87
CONTRACTO	R ASTENATION	A ON A		DATE:	
30171130101	5	FRICE	-	10/2	1/87
70	<del></del>			, –	

## TIME OIL CO. P.O. Box 24447 Terminal Annex Seattle, WA 98124

			Seattle	, WA	98124		
TO: SRH	Associates	, Inc.				WORK OF	RDER
PO	Box 14005			_	NO. 1 PLACE THIS NUMBER ON YOUR INVOICE		
	tland, OR 9			_		CORRESPONDE	_ <u> </u>
	n: John Rudo						
	$_{}$ and $y$	you are authoi	his work rized to	orde perf	r is an add orm the fol	iendum to d llowing add	contract dated ditional work at
	ed price(s)				_		
If this contract	block <u> XX</u>   . . You are a	is checked, that the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract	nis work perform	orde the	r is not ar following v	n addendum vork at the	to any established stated price(s).
ADDRESS:	(Show street	t address and	city of	iob	site)		PROPERTY NO.:
	•	rd, Portland,	•	3	,		03–123
REQUESTED	BY:	AUTHORIZED I	BY:	DATE	JOB REQUIF	RED: INSPE	CTION REQUIRED:
Fre	d Proby	al		8/2	<b>L</b> 8/87		BY
This work	c order is	expense of:	<u> _</u>   то	C	<u> _</u>   отнея	₹	TAXABLE
QUANTITY			DESCR	IPTIO	N		AMOUNT
	Measure water level and pH in Northwest Terminal			rminal			
	monitoring wells "A" through "H" and at river.						
	Collect water samples from monitoring wells and						
	analyse f	for pentachlor	ophenol.		_		
							٧
			Time ar	nd Mat	erials Not	To Exceed	\$2,200.00
							•
PROJECT DESCRIPTION:  Northwest Terminal woodtreating cleanup.  TOLS011054							
TIME OIL	O. (SIGNAT)	IRED:				DATE:	
G	tend 5	no				8/17	182
CONTRACTO	SIGNATURE	1/20	21	7		DATE:	12/87
<del></del>	0-7		X-3X-3X-				

## SRH ASSOCIATES, INC. ENVIRONMENTAL MANAGEMENT

TO:

TIME OIL COMPANY
PO Box 24447
Terminal Station
Seattle, WA 98124-0447
Attn: John Denham

December 11, 1987 #40179

In reference to: Portland Feasibility	Study HOURS	AMOUNT
-Prof. Services	1.50	75.00
TOTAL PROFESSIONAL SERVICES:	1.50	\$75.00
Previous Balance		\$2,810.53
-Payment - thank you -Payment - thank you	(	\$1,778.31) \$1,032.22)
Total Payments	(	\$2,810.53)
BALANCE DUE		\$75.00

Note 12/30/87

John Ruddick says to ignore this.

FLP

123 NE THIRD AVE.

PORTLAND, OR 97232

(503) 232-0824

Date 12/11/87 Time 4:36 pm SRH ASSOCIATES, INC. DETAIL OF CHARGES

Page 1

through	Description	Accum hrs	Rate	Billable \$
Client -	1003-2 Time Oil			
11/06/87	REPORT PREPARATION	1.50	50.00	75.00
11/12/87	PCP SOIL CLEANUP FEASIBILITY STUDY	1.00	70.00	0.00
Subtotal	for Prof. Services			
		2.50		75.00
Suptotal	for 1003-2 Time Oil	2.50		75.00

# PROPOSAL FOR SITE REMEDIATION ACTIVITIES TIME OIL COMPANY NORTHWEST TERMINAL PENTACHLOROPHENOL RELEASES

**DECEMBER 17, 1987** 

Prepared for: TIME OIL COMPANY 2737 WEST COMMODORE WAY SEATTLE, WASHINGTON

Prepared by:
SRH ASSOCIATES, INC
123 NE THIRD AVENUE SUITE 230
PORTLAND, OREGON 97214

### INTRODUCTION

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Time oil company operates an oil storage facility at 12005 N Burgard Rd. in Portland, Oregon. From 1976 to 1982, Time operated a formulating and blending operation under an agreement with Koppers, Co. to manufacture wood treating chemicals for the forest products industry. Releases of Pentachlorophenol (PCP) from this operation occured during this time, resulting in contamination of soils and, subsequently, groundwater in the area used for this purpose.

Investigatory data generated by Time and its consultants has been summarized in a previous document entitled "Pentachlorophenol Contamination - Northwest Terminal." Since this report was published, contamination of groundwater with PCP has been detected at monitoring well "B". Levels of 2300 and 1000 ppb were detected in the fall of 1987.

This data indicates that contamination from the wood treating chemicals area is migrating from the contaminated soil area via the groundwater route. This proposal addresses the following general tasks:

- 1) Excavation and stabilization of the existing contaminated soil to prevent further migration of contaminants. This task is estimated to require from 3 to 4 weeks for completion with a budgetary cost estimate of \$58,500.
- Replacement of damaged or non-functional existing monitoring wells and the installation of one cluster well for contaminant monitoring and future groundwater recovery purposes. This task is estimated to require from 2 to 4 weeks for completion and may be performed simultaneously with task 1. For budgetary purposes this task is estimated to cost \$12,300.
- Design, testing, development, construction and operation of a soil washing process to extract contaminants from the soil with provisions for treatment or disposal of the extracted contaminants. A rough budgetary estimate for the design and testing elements of this task is \$32,200, while the other elements, contingent upon the design and testing results, cannot be approximated. The time required for completion cannot be determined at this time.
- 4) Recovery and biological treatment of contaminated groundwater. A rough budgetary estimate for the design of the completed system and the construction of the groundwater recovery network is \$28,000. The construction and operation costs of the treatment system are contingent on the design parameters and the determination of the depth of groundwater

contamination. The time required for completion cannot be determined at this time.

While tasks 1 and 2 can be reasonably predicted from what is currently known about the Northwest Terminal site, tasks 3 and 4 include several assumptions regarding such factors as the extent of groundwater contamination, regulatory cooperativity, and equipment availability and lead times. Because of these considerations the cost estimates ventured for tasks 3 and 4 are subject to significant potential error.

#### 1. EXCAVATION AND STABILIZATION

Since the migration of PCP into the groundwater system underlying the Northwest terminal has been detected and confirmed, the objective of primary importance to TOC is containment and stabilization of the PCP source. SRH proposes that the contaminated soils be excavated using a bucket excavator, front end loader and end dump trucks, and placed on an impervious liner in a secure area of the Northwest terminal property. Before the initiation of actual work, a detailed work plan will be prepared for review by TOC.

The excavation and movement of the soil would be performed by personnel trained in hazardous waste activity and having necessary medical monitoring and surveillance as required by OSHA and the State of Oregon Accident Prevention Division to limit liability to TOC. Other provisions of RCRA and other state and federal regulations will be followed, as they are relevant and applicable to this operation.

The soil would be removed according to contamination contours described in the October 1986 report. A 500 ppm cleanup standard is proposed based on initial discussions with TOC. An estimated 2700 cubic yards of soil is involved which will result in an excavated volume of approximately 3700 cubic yards due to expansion.

SRH proposes that the material be placed on a flat area of TOC property south of the tank farm area. A soil berm would be constructed from natural soils using a dozer and the stockpile site lined with an impermeable, reinforced synthetic material with an underliner of geotextile fabric. SRH preliminarily recommends a 36 - 45 mil thick reinforced, chlorinated PVC with a 6 oz non-woven geotextile beneath, or equivalent system. The edges of the liner would be anchored in the berm to prevent slippage. Following placement of the soil in the stockpile, the area would be covered with a second liner, consisting of a lighter material such as Shelterite 8218, to protect the surface from erosion at minimal cost.

The contained stockpile would thus be isolated from the environment and would cease to release PCP to the environment

while providing a convenient location for transfer of the soil to the subsequent treatment operation.

The excavation site would be backfilled with native materials from a borrow site located on TOC property, following the placement of an infiltration gallery for treatment of groundwater. The groundwater treatment operation and infiltration gallery is discussed below.

The stabilization of the contaminated soil is, in SRH's opinion, the most crucial element of this proposal and should be initiated at TOC's earliest convenience.

Time to complete task 1 = 3 - 4 weeks

Budgetary cost estimate, task 1 = \$58,500

### 2. RETROFIT OF MONITORING WELLS

Since several of the well points installed by TOC have been damaged or were ineffective as monitoring wells for a number of reasons, SRH proposes to install new 2" PVC monitoring wells at existing locations A, E, and G. A new well at existing location B would be a 6" diameter well to provide a point for future groundwater recovery, allowing this well to serve a dual function and thereby reduce costs.

A new cluster well with completion depths at 15, 25 and 35 feet below the ground surface would be installed between monitoring well locations B and 4 to determine the vertical extent of PCP contamination. These wells would also be constructed of 6" diameter casing to allow for groundwater recovery.

Time to complete task 2 = 2-4 weeks

Budgetary cost estimate, task 2 = \$12,300

### 3. SOIL TREATMENT

The assessment of alternatives for soil treatment or disposal have been previously addressed by SRH. The recommended technology for soil treatment was determined to be liquid extraction of the contaminants (soil washing) This technology was determined to have the lowest overall costs to TOC. Several advances have occured in the research of soil washing technology since the feasibility assessment was performed. However, no commercial operation exists yet for PCP. Because of the status of this technology, SRH proposes that the development of the soil treatment process for TOC be performed in several discrete steps.

These steps are described below.

## A. SELECT SOIL WASHING SOLUTION

A variety of compounds exist that have the potential to wash PCP from TOC's soil. The extraction solution providing optimum properties for removal of the PCP will be determined using jar tests. Jar tests are inexpensive methods for evaluating the efficiency of different extraction solutions in a batch process. SRH proposes to perform these tests at TOC's Northwest Terminal facility using samples of soil obtained from the site. Chemical analyses, as necessary, will be performed by a laboratory of TOC's choice.

### B. <u>DESIGN SOIL CONTACTOR</u>

The vessel in which the soil will be brought into contact with the washing solution will be designed based on the soil washing solution selected in step A. The system will provide total immersion of contaminated soils in the soil washing solution. This process will utilize a high shear system with a pug mill or similar device to ensure complete contact with the washing solution. Based on the results of the jar tests performed in step A, a single or multiple stage contactor will be selected.

#### C. DESIGN SOIL RINSER

After the soil has had sufficient contact with the washing solution, it will be rinsed with a non-hazardous liquid, such as water, to remove residual extractant and to recover the cleaned soil particles for return to the excavation site or other location of TOC's choice. The rinser will incorporate a filter press and solid/liquid recovery system. The rinser will allow for the recovery of the removed PCP in a tank or other vessel for subsequent liquid treatment.

## D. DESIGN LIQUID TREATMENT SYSTEM

The recovered soil washing solution containing PCP will be treated to remove and/or destroy PCP and any other hazardous contaminants. The design of this system will be based on the previous systems and will use physical and chemical techniques for separation and purification.

Time to complete task 3, steps A - D = 8-12 weeks

Budgetary cost estimate, task 3, steps A -D = \$32,200

#### 4. GROUNDWATER TREATMENT

The contaminated groundwater at TOC represents the primary pathway for PCP migration off-site. The objective of the groundwater recovery network discussed above will be to pump contaminated groundwater to a surface treatment unit for bacterial degradation of PCP. The treated groundwater will be reintroduced into the upper aquifer to flush out contaminants and to introduce nutrients and oxygen necessary to promote "in situ" bacterial degradation of PCP.

The final design of this system is closely tied to the findings from the renovated groundwater monitoring system described above, the failure of which has restricted conclusions regarding the precise extent of groundwater contamination at TOC. Recovery well locations and pumping rates are examples of the type of conclusions that be affected by the groundwater monitoring data.

The groundwater treatment system will include a recovery well network, using existing wells to the maximum extent possible, a pumping system to deliver the recovered water to an aerobic biological reactor and an infiltration gallery at the site of the original contamination to discharge treated water and to implement flushing of the soil column at this location.

Time to complete task 4 = 6-10 weeks

Budgetary cost estimate, task 4 = \$28,000, exclusive of treatment system construction and operation.

## MEMORANDUM

January 7, 1988

TO:

Robert Abendroth

Seattle

FROM:

Fred Proby

Seattle

SUBJECT: PENTACHLOROPHENOL CONTAMINATION - NORTHWEST TERMINAL

In August, 1987 penta was detected in groundwater for the first time in monitoring well B downgradient from site of contamination. Concentration was 2.3 ppm. Sample taken in October showed 1.0 ppm. State standard is 0.15 ppm. It is necessary to stabilize the contaminated soil as soon as possible to prevent further groundwater contamination. Recommended method is to excavate soil, place it on a plastic liner and cover it with plastic.

A brief history of project to date follows.

In June, 1985 288 cubic yards of soil contaminated with penta were disposed of at Arlington. In December, 1985 EPA advised that penta could no longer be placed in a landfill. Soil must be treated either on-site or off-site. Soil contamination extends to the water table 12 feet below ground level.

Approximately 3,000 cubic yards of soil are contaminated in excess of the 600 ppm maximum allowable penta concentration set by the Oregon Department of Environmental Quality. In September, 1986 SRH Associates, Inc. summarized project history and evaluated twelve alternative technologies for treating soil. Recommended approach is soil washing. Penta treatment is a new science so tests are needed to determine best washing solution. Management authorization for conduct of tests was requested in January, 1987. Action was postponed pending outcome of negotiations with Koppers. No real progress has been made.

SRH was recently asked to revise their earlier proposal to address soil stabilization and groundwater treatment. This proposal (attached) covers tasks 3, 4, 5 and 6 listed below.

The cost listed for task 7, "construct and operate clean-up system", is a preliminary estimate and may be revised depending on results of preceeding tasks.

Request authorization to proceed immediately with work described in SRH proposal.

## Following is a summary of expended and projected costs for this project:

		SPENT	<u>PROJECTED</u>	<u>TOTAL</u>
1.	Remove and dispose of equipment and surface soil. Complete.	\$ 57,200	\$ 0	\$ 57,200
2.	Monitor soil and groundwater contamination. On-going.	36,700	12,000	48,700
3.	Prevent further PCP migration to groundwater. To be done.	0	58,500	58,500
4.	Install recovery wells. To be done.	0	12,300	12,300
5.	Design soil treatment system. On-going.	18,500	32,200	50,700
6.	Design groundwater treatment system. To be done.	. 0	28,000	28,000
7.	Construct and operate clean-up system. To be done.	0	700,000	700,000
	TOTALS	\$112,400	\$843,000	\$955,400

FLP/jam

### SRH ASSOCIATES, INC. ENVIRONMENTAL MANAGEMENT

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December 24, 1987

Mr. John Denham Time Oil Company PO Box 24447 Terminal Station Seattle, WA 98124-0447

Dear John,

Enclosed is the revised proposal for site remediation at TOC's Northwest Terminal in Portland. I do expect to be in the office most of the week between Christmas and New Year's as well as the first week of January. Give me a call if you have any questions.

Best wishes for the holiday season, John. I'm looking forward to working with you in 1988.

Yours Truly,

SRH ASSOCIATES, INC.

John H. Ruddick

123 NE THIRD AVE.

PORTLAND, OR 97232

(503) 232-0824

## PROPOSAL FOR SITE REMEDIATION ACTIVITIES TIME OIL COMPANY NORTHWEST TERMINAL PENTACHLOROPHENOL RELEASES

**DECEMBER 17, 1987** 

Prepared for: TIME OIL COMPANY 2737 WEST COMMODORE WAY SEATTLE, WASHINGTON

Prepared by:
SRH ASSOCIATES, INC
123 NE THIRD AVENUE SUITE 230
PORTLAND, OREGON 97214

#### INTRODUCTION

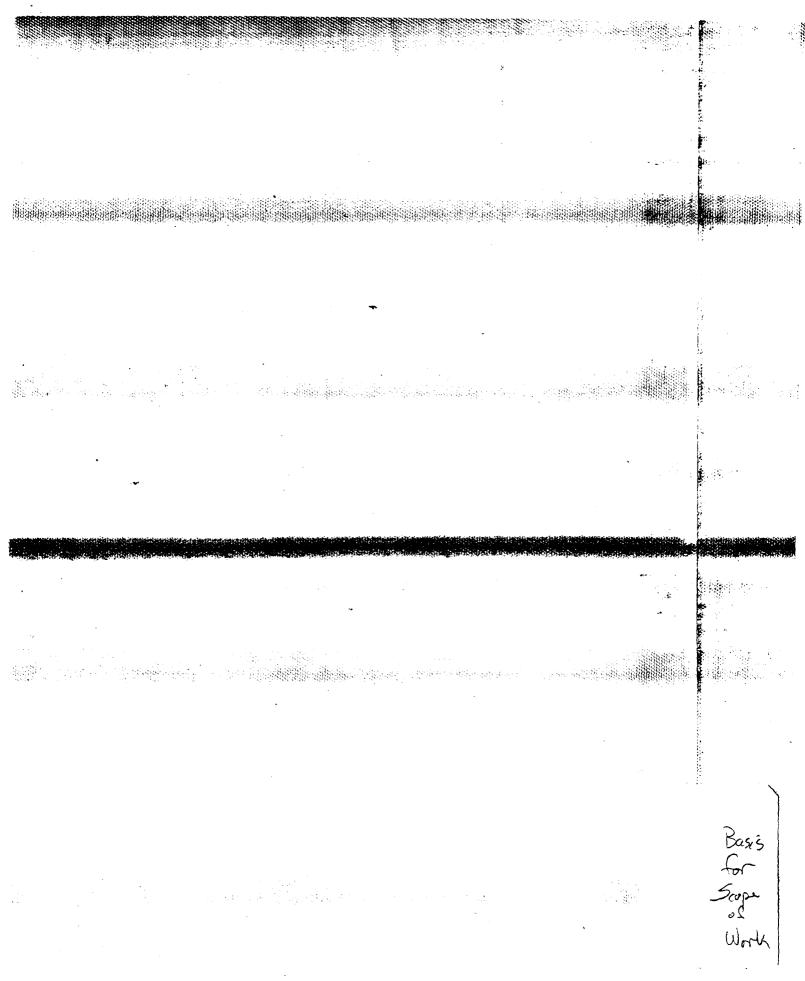
Time oil company operates an oil storage facility at 12005 N Burgard Rd. in Portland, Oregon. From 1976 to 1982, Time operated a formulating and blending operation under an agreement with Koppers, Co. to manufacture wood treating chemicals for the forest products industry. Releases of Pentachlorophenol (PCP) from this operation occured during this time, resulting in contamination of soils and, subsequently, groundwater in the area used for this purpose.

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Investigatory data generated by Time and its consultants has been summarized in a previous document entitled "Pentachlorophenol Contamination - Northwest Terminal." Since this report was published, contamination of groundwater with PCP has been detected at monitoring well "B". Levels of 2300 and 1000 ppb were detected in the fall of 1987.

This data indicates that contamination from the wood treating chemicals area is migrating from the contaminated soil area via the groundwater route. This proposal addresses the following general tasks:

- 1) Excavation and stabilization of the existing contaminated soil to prevent further migration of contaminants. This task is estimated to require from 3 to 4 weeks for completion with a budgetary cost estimate of \$58,500.
- 2) Replacement of damaged or non-functional existing monitoring wells and the installation of one cluster well for contaminant monitoring and future groundwater recovery purposes. This task is estimated to require from 2 to 4 weeks for completion and may be performed simultaneously with task 1. For budgetary purposes this task is estimated to cost \$12,300.
- Design, testing, development, construction and operation of a soil washing process to extract contaminants from the soil with provisions for treatment or disposal of the extracted contaminants. A rough budgetary estimate for the design and testing elements of this task is \$32,200, while the other elements, contingent upon the design and testing results, cannot be approximated. The time required for completion cannot be determined at this time.
- 4) Recovery and biological treatment of contaminated groundwater. A rough budgetary estimate for the design of the completed system and the construction of the groundwater recovery network is \$28,000. The construction and operation costs of the treatment system are contingent on the design parameters and the determination of the depth of groundwater



contamination. The time required for completion cannot be determined at this time.

While tasks 1 and 2 can be reasonably predicted from what is currently known about the Northwest Terminal site, tasks 3 and 4 include several assumptions regarding such factors as the extent of groundwater contamination, regulatory cooperativity, and equipment availability and lead times. Because of these considerations the cost estimates ventured for tasks 3 and 4 are subject to significant potential error.

#### 1. EXCAVATION AND STABILIZATION

Since the migration of PCP into the groundwater system underlying the Northwest terminal has been detected and confirmed, the objective of primary importance to TOC is containment and stabilization of the PCP source. SRH proposes that the contaminated soils be excavated using a bucket excavator, front end loader and end dump trucks, and placed on an impervious liner in a secure area of the Northwest terminal property. Before the initiation of actual work, a detailed work plan will be prepared for review by TOC.

The excavation and movement of the soil would be performed by personnel trained in hazardous waste activity and having necessary medical monitoring and surveillance as required by OSHA and the State of Oregon Accident Prevention Division to limit liability to TOC. Other provisions of RCRA and other state and federal regulations will be followed, as they are relevant and applicable to this operation.

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SRH proposes that the material be placed on a flat area of TOC property south of the tank farm area. A soil berm would be constructed from natural soils using a dozer and the stockpile site lined with an impermeable, reinforced synthetic material with an underliner of geotextile fabric. SRH preliminarily recommends a 36 - 45 mil thick reinforced, chlorinated PVC with a 6 oz non-woven geotextile beneath, or equivalent system. The edges of the liner would be anchored in the berm to prevent slippage. Following placement of the soil in the stockpile, the area would be covered with a second liner, consisting of a lighter material such as Shelterite 8218, to protect the surface from erosion at minimal cost.

The contained stockpile would thus be isolated from the environment and would cease to release PCP to the environment

while providing a convenient location for transfer of the soil to the subsequent treatment operation.

The excavation site would be backfilled with native materials from a borrow site located on TOC property, following the placement of an infiltration gallery for treatment of groundwater. The groundwater treatment operation and infiltration gallery is discussed below.

The stabilization of the contaminated soil is, in SRH's opinion, the most crucial element of this proposal and should be initiated at TOC's earliest convenience.

Time to complete task 1 = 3 - 4 weeks

Budgetary cost estimate, task 1 = \$58,500

#### 2. RETROFIT OF MONITORING WELLS

Since several of the well points installed by TOC have been damaged or were ineffective as monitoring wells for a number of reasons, SRH proposes to install new 2" PVC monitoring wells at existing locations A, E, and G. A new well at existing location B would be a 6" diameter well to provide a point for future groundwater recovery, allowing this well to serve a dual function and thereby reduce costs.

A new cluster well with completion depths at 15, 25 and 35 feet below the ground surface would be installed between monitoring well locations B and 4 to determine the vertical extent of PCP contamination. These wells would also be constructed of 6" diameter casing to allow for groundwater recovery.

Time to complete task 2 = 2-4 weeks

Budgetary cost estimate, task 2 = \$12,300

#### 3. SOIL TREATMENT

The assessment of alternatives for soil treatment or disposal have been previously addressed by SRH. The recommended technology for soil treatment was determined to be liquid extraction of the contaminants (soil washing) This technology was determined to have the lowest overall costs to TOC. Several advances have occured in the research of soil washing technology since the feasibility assessment was performed. However, no commercial operation exists yet for PCP. Because of the status of this technology, SRH proposes that the development of the soil treatment process for TOC be performed in several discrete steps.

These steps are described below.

#### A. SELECT SOIL WASHING SOLUTION

A variety of compounds exist that have the potential to wash PCP from ToC's soil. The extraction solution providing optimum properties for removal of the PCP will be determined using jar tests. Jar tests are inexpensive methods for evaluating the efficiency of different extraction solutions in a batch process. SRH proposes to perform these tests at ToC's Northwest Terminal facility using samples of soil obtained from the site. Chemical analyses, as necessary, will be performed by a laboratory of ToC's choice.

#### B. DESIGN SOIL CONTACTOR

The vessel in which the soil will be brought into contact with the washing solution will be designed based on the soil washing solution selected in step A. The system will provide total immersion of contaminated soils in the soil washing solution. This process will utilize a high shear system with a pug mill or similar device to ensure complete contact with the washing solution. Based on the results of the jar tests performed in step A, a single or multiple stage contactor will be selected.

#### C. DESIGN SOIL RINSER

After the soil has had sufficient contact with the washing solution, it will be rinsed with a non-hazardous liquid, such as water, to remove residual extractant and to recover the cleaned soil particles for return to the excavation site or other location of TOC's choice. The rinser will incorporate a filter press and solid/liquid recovery system. The rinser will allow for the recovery of the removed PCP in a tank or other vessel for subsequent liquid treatment.

#### D. <u>DESIGN LIQUID TREATMENT SYSTEM</u>

The recovered soil washing solution containing PCP will be treated to remove and/or destroy PCP and any other hazardous contaminants. The design of this system will be based on the previous systems and will use physical and chemical techniques for separation and purification.

Time to complete task 3, steps A - D = 8-12 weeks

Budgetary cost estimate, task 3, steps A -D = \$32,200

#### 4. GROUNDWATER TREATMENT

The contaminated groundwater at TOC represents the primary pathway for PCP migration off-site. The objective of the groundwater recovery network discussed above will be to pump contaminated groundwater to a surface treatment unit for bacterial degradation of PCP. The treated groundwater will be reintroduced into the upper aquifer to flush out contaminants and to introduce nutrients and oxygen necessary to promote "in situ" bacterial degradation of PCP.

The final design of this system is closely tied to the findings from the renovated groundwater monitoring system described above, the failure of which has restricted conclusions regarding the precise extent of groundwater contamination at TOC. Recovery well locations and pumping rates are examples of the type of conclusions that be affected by the groundwater monitoring data.

The groundwater treatment system will include a recovery well network, using existing wells to the maximum extent possible, a pumping system to deliver the recovered water to an aerobic biological reactor and an infiltration gallery at the site of the original contamination to discharge treated water and to implement flushing of the soil column at this location.

Time to complete task 4 = 6-10 weeks

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Budgetary cost estimate, task 4 = \$28,000, exclusive of treatment system construction and operation.

#### CONSTRUCTION CONTRACT

#### ENVIRONMENTAL CLEAN-UP

THIS CONTRACT is made as of	the day o	of	, 19 at
Seattle, Washington, by and	between Time Oil	Co., a Washing	gton corporation
("Time" herein), located at	2737 West Commod	lore Way, Seatt	le, Washington
98199, andS.R	.H. Associates, I	nc.	· -
("Contractor" herein), loca	ted at <u>123 N.E.</u>	Third Avenue, A	Portland, OR 97214
for work relating to environ	nmental clean-up	at 12005 North	Burgard Road,
Portland, OR ("Northwest Ter	rminal").		

IT IS AGREED by and between the parties hereto as follows:

- 1. WORK TO BE PERFORMED: The Contractor hereby agrees to perform services in accordance with the following Scope of Work. Contractor admits that the Scope of Work is sufficient for their intended purpose, and that work can be successfully executed in accordance therewith. Time may make any alterations, deviations, additions or omissions from the aforesaid Scope of Work, without affecting or making void this contract, however, no work other than as provided herein or specifically authorized by Time in writing shall become a part of this contract. Additional work is to be authorized only in writing.
  - a. Before the initiation of the following tasks, prepare a detailed work plan for Time's approval in accordance with task 1, 2 and 3a of SRH proposal dated December 17, 1987.
  - b. Excavate soil contaminated with pentachlorophenol (PCP) in excess of 500 ppm and place it on an impervious liner located in a secure area of the terminal such that the excavated soil is isolated from the environment and ceases to release PCP. Install an infiltration gallery in the excavated site for the purpose of enhanced bioremediation. Backfill with clean soil from a borrow site located on the terminal property.
  - c. Replace existing well points A, E and G with 2" PVC monitoring wells. Replace existing well point B with a 6" diameter well suitable for groundwater recovery. Install a cluster of 6" diameter PVC wells located between existing points B and 4 having completion depths of 15, 25 and 35 feet below ground to determine the vertical extent of PCP contamination.
  - d. Conduct tests to determine the optimum extraction solution for "washing" PCP from the soil at Northwest terminal.
- PRICE: Time agrees to pay contractor <u>seventy-five thousand</u> (\$75,000.00) dollars, plus state sales tax, if applicable, which amount shall be referred to herein as the "contract price". Any change to the contract price may only be made by written change order or other writing executed by both parties hereto. Any work performed which is not covered by a written change order shall be considered fully paid for upon payment of the contract price.
- 3. TERMS OF PAYMENT: Progress billings are to be made after each 30 day period of this contract for work completed as of that date. Time will pay such billings less ten percent retainage. Final payment is to be made after acceptance of the completed project by Time.

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- 4. <u>BOND:</u> Contractor agrees that before commencement of any work hereunder it will promptly furnish Time with a faithful performance bond issued by a surety company acceptable to Time in an amount equal to the total contract price guaranteeing completion of all work and performance of all obligations hereunder. Said bond shall cover any subsequent changes, modifications or amendments to this contract without the prior consent of the surety.
- TIME FOR PERFORMANCE: All work shall be completed within ten weeks from the date of this contract, exclusive of permit approval by government agencies.
- 6. INSURANCE: Until completion of its performance hereunder, Contractor agrees to maintain Workmen's Compensation Insurance in the form and amounts required by state law, and Broad Form Comprehensive Public Liability with minimum limits of \$1,000,000.00 per person and \$1,000,000.00 per accident for bodily injury and \$500,000.00 per accident

for property damage. Contractor shall promptly deliver to Time certificates of said insurance naming Time as an additional insured before commencing work and such certificates shall provide that said insurance shall not be cancelled prior to thirty (30) days written notice to Time.

- 7. PERMITS: Contractor agrees, at his expense, to obtain all governmental permits, licenses and approvals, and to comply with all laws, rules, zoning ordinances, regulations and requirements, now or hereafter existing, of all governmental authorities concerned therewith, applicable to Contractor's activities pursuant to the Scope of Work. Contractor shall furnish Time with written evidence of all such necessary permits, licenses and approvals before commencing work. Time shall have the right to withhold from any payments due hereunder an amount sufficient to compensate it for any damages it may incur as a result of Contractor's failure to secure any necessary permit or comply with any law or regulation.
- ASSIGNMENT: Contractor shall not assign or transfer this contract, or any interest therein or any part thereof, without the consent in writing of Time.
- 9. <u>GUARANTEE</u>: Contractor agrees to perform all work in a workmanlike manner and guarantees all work will be free from defects in material and labor for a period of one year after completion. No payment made under this contract shall be construed to be an acceptance of defective work or improper materials. Contractor further guarantees that it is familiar with the work site and scope of work and is competent to perform the work described within the time stated herein.
- 10. <u>LIENS:</u> Contractor covenants that no liens will attach against the subject premises for material or labor arising from the work herein contemplated. If at any time there shall be evidence of lien or claim for which, if established, Time may become liable, and which is chargeable to Contractor, Time shall have the right to retain out of any payment then due, or thereafter to become due, an amount sufficient to completely indemnify Time against such lien or claim, should there prove to be any such claim.
- 11. INDEMNITY: Contractor agrees to indemnify Time and hold Time harmless from any and all claims, liabilities, demands, actions, costs and expense (including attorneys' fees) of whatsoever nature, arising out of any acts or omissions of contractor, its agents or employees, hereunder. The parties recognize that even with the utmost care being exercised, escape of polluting substances might occur while Contractor is rendering services under this Agreement. It is therefore agreed that to the extent such escape shall occur that the responsibility to governmental authorities for such escapement is that of Time, and that Time agrees to indemnify and hold Contractor harmless of and from any loss, damage, injury, liability or claim resulting from an aggravation of the existing pollution problem which is not caused or contributed to by the negligence of Contractor.
- 12. <u>REMEDIES:</u> All rights and remedies of Time herein shall be cumulative, and no right or remedy shall be exclusive of any other, and the pursuit of any such right or remedy shall not be deemed a waiver of any other or different remedy or relief which Time might otherwise be entitled by law or in equity.
- 13. <u>FORCE MAJEURE:</u> Contractor shall not be held liable for delays resulting from fire, earthquakes, war, or acts of any government, whether foreign or domestic, or any other cause beyond his control. However, contractor has specifically taken into account and shall be held liable for potential delays caused by labor disturbances, material availability, and weather.
- 14. INTERPRETATION: This contract will be deemed executed and shall become binding and of full force and effect when signed by Time at its office by its authorized representative. This contract incorporates the entire agreement between the parties except as modified by written change order or other written agreement signed by both parties.
- 15. <u>APPLICABLE LAW:</u> The nature, validity and interpretation of this contract shall be governed by the laws of the State of Washington.

DATED	DATED
TIME OIL CO.	CONTRACTOR
By:	By:

for property damage. Contractor shall promptly deliver to Time certificates of said insurance naming Time as an additional insured before commencing work and such certificates shall provide that said insurance shall not be cancelled prior to thirty (30) days written notice to Time.

- 7. <u>PERMITS:</u> Contractor agrees, at his expense, to obtain all governmental permits, licenses and approvals, and to comply with all laws, rules, zoning ordinances, regulations and requirements, now or hereafter existing, of all governmental authorities concerned therewith, applicable to Contractor's activities pursuant to the Scope of Work. Contractor shall furnish Time with written evidence of all such necessary permits, licenses and approvals before commencing work. Time shall have the right to withhold from any payments due hereunder an amount sufficient to compensate it for any damages it may incur as a result of Contractor's failure to secure any necessary permit or comply with any law or regulation.
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- 15. APPLICABLE LAW: The nature, validity and interpretation of this contract shall be governed by the laws of the State of Washington.

DATED	DATED
TIME OIL CO.	CONTRACTOR
Ву:	By:
	TOLS011075

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#### CONSTRUCTION CONTRACT

#### ENVIRONMENTAL CLEAN-UP

THIS CONTRACT is made as of	the day of		at
Seattle, Washington, by and	between Time Oil Co.,	a Washington corporati	ion
("Time" herein), located at 2737 West Commodore Way, Seattle, Washington			
98199, and S.R			
("Contractor" herein), loca	ed at 123 N.E. Third	Avenue, Portland, OR	97214
for work relating to environ	mental clean-up at <u>12</u>	005 North Burgard Road,	
Portland, OR ("Northwest Ter	rminal").		-

IT IS AGREED by and between the parties hereto as follows:

- 1. WORK TO BE PERFORMED: The Contractor hereby agrees to perform services in accordance with the following Scope of Work. Contractor admits that the Scope of Work is sufficient for their intended purpose, and that work can be successfully executed in accordance therewith. Time may make any alterations, deviations, additions or omissions from the aforesaid Scope of Work, without affecting or making void this contract, however, no work other than as provided herein or specifically authorized by Time in writing shall become a part of this contract. Additional work is to be authorized only in writing.
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  - b. Excavate soil contaminated with pentachlorophenol (PCP) in excess of 500 ppm and place it on an impervious liner located in a secure area of the terminal such that the excavated soil is isolated from the environment and ceases to release PCP. Install an infiltration gallery in the excavated site for the purpose of enhanced bioremediation. Backfill with clean soil from a borrow site located on the terminal property.
  - c. Replace existing well points A, E and G with 2" PVC monitoring wells. Replace existing well point B with a 6" diameter well suitable for groundwater recovery. Install a cluster of 6" diameter PVC wells located between existing points B and 4 having completion depths of 15, 25 and 35 feet below ground to determine the vertical extent of PCP contamination.
  - d. Conduct tests to determine the optimum extraction solution for "washing" PCP from the soil at Northwest terminal.
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- 3. <u>TERMS OF PAYMENT:</u> Progress billings are to be made after each <u>30</u> day period of this contract for work completed as of that date. Time will pay such billings less ten percent retainage. Final payment is to be made after acceptance of the completed project by Time.
- 4. <u>80ND</u>: Contractor agrees that before commencement of any work hereunder it will promptly furnish Time with a faithful performance bond issued by a surety company acceptable to Time in an amount equal to the total contract price guaranteeing completion of all work and performance of all obligations hereunder. Said bond shall cover any subsequent changes, modifications or amendments to this contract without the prior consent of the surety.
- TIME FOR PERFORMANCE: All work shall be completed within ten weeks from the date of this contract, exclusive of permit approval by government agencies.

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6. INSURANCE: Until completion of its performance hereunder, Contractor agrees to maintain Workmen's Compensation Insurance in the form and amounts required by state law, and Broad Form Comprehensive Public Liability with minimum limits of \$1,000,000.00 per person and \$1,000,000.00 per accident for bodily injury and \$500,000.00 per accident

for property damage. Contractor shall promptly deliver to Time certificates of said insurance naming Time as an additional insured before commencing work and such certificates shall provide that said insurance shall not be cancelled prior to thirty (30) days written notice to Time.

- PERMITS: Contractor agrees, at his expense, to obtain all governmental permits, licenses and approvals, and to comply with all laws, rules, zoning ordinances, regulations and requirements, now or hereafter existing, of all governmental authorities concerned therewith, applicable to Contractor's activities pursuant to the Scope of Work. Contractor shall furnish Time with written evidence of all such necessary permits, licenses and approvals before commencing work. Time shall have the right to withhold from any payments due hereunder an amount sufficient to compensate it for any damages it may incur as a result of Contractor's failure to secure any necessary permit or comply with any law or regulation.
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- 9. <u>GUARANTEE</u>: Contractor agrees to perform all work in a workmanlike manner and guarantees all work will be free from defects in material and labor for a period of one year after completion. No payment made under this contract shall be construed to be an acceptance of defective work or improper materials. Contractor further guarantees that it is familiar with the work site and scope of work and is competent to perform the work described within the time stated herein.
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- 12. <u>REMEDIES</u>: All rights and remedies of Time herein shall be cumulative, and no right or remedy shall be exclusive of any other, and the pursuit of any such right or remedy shall not be deemed a waiver of any other or different remedy or relief which Time might otherwise be entitled by law or in equity.
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- 15.  $\frac{\text{APPLICABLE LAW:}}{\text{shall be governed by the laws of the State of Washington.}}$

DATED	DATED
TIME OIL CO.	CONTRACTOR
By:	By:

## SRH ASSOCIATES, INC. ENVIRONMENTAL MANAGEMENT

February 2, 1988

Fred Proby
Time Oil Company
12005 N Burgard Rd.
Portland, Oregon 97203

#### Dear Fred:

We have completed the budgetary cost estimate for excavating and stabilizing PCP contaminated soil at the Time Oil Northwest Terminal facility. The cost breakdown covering excavation and transfer of soil, preparation of storage area, stabilization of stockpile area, and backfill of excavated area is attached as Table 1. The total cost for the project is estimated at \$58,500. The excavation and stabilization is estimated to require from 3 to 4 weeks to complete. Details of the excavation and stabilization plan have previously been outlined in a November 17, 1987 proposal from SRH Associates to Time Oil Company.

An alternate proposal utilizing tank storage rather than a lined waste pile has also been developed. In the tank proposal, contaminated soil would be stored in existing tanks prior to treatment. Approximately 37,000 bbls of tank capacity are required to store the contaminated soil assuming that the tanks may loaded half full with soil. The cost breakdown including excavation and transfer of soil, loading of tanks, and backfill of excavation area is attached as Table 2.

Loading of material into the tanks is estimated to extend excavation and transfer time by at least 5 days so that from 4 to 5 weeks are required to complete the project. The total cost for the project is estimated at \$78,650. An additional 5 days delay in excavation and transfer caused by tank loading bottlenecks would increase the total cost to \$91,650. As noted in Table 2, this estimate assumes that (1) inexpensive conveyor systems typically used in waste transfer will be adequate for efficiently loading the tanks, (2) Time Oil will provide 37,000 bbls capacity of clean tanks in good repair, and will install and remove door sheets in the tanks for loading material by conveyor.

Lined waste piles have been used extensively for short and long term storage of hazardous materials since the passage of RCRA in 1976. When properly installed and maintained, they provide a relatively low risk of contamination to the surrounding environment. Waste pile maintenance typically consists of brief inspections of the pile once or twice a month for evidence of lifting, tears, or other exposure.

123 NE THIRD AVE. PORTLAND, OR 97232 (503) 232-0824

The choice of liner material is the primary variable for determining the approximate useful life of the waste pile. The reinforced, chlorinated PVC liner specified for the attached estimate is typically used for 1 to 2 years of storage. Higher grades of liner may be specified to increase the storage life to approximately 10 years. These liners cost about three times as much as the PVC liners and would add an additional \$14,000 to the waste pile estimate.

Storage tanks are typically used to store liquid or slurry hazardous wastes. Since liquids and slurries may be rapidly pumped into and out of tanks, loading and unloading time requirements and costs are usually minimal. It is possible, however, to store solid waste in tanks. If solids are loaded into tanks, care must be taken to avoid contaminating the surrounding area in the process of transferring the solids from the delivery trucks to the tanks. If more than one tank is used to store the solids, equipment must be moved from one tank to the next as tanks are filled.

Metal tank storage life is dependent on the initial state of the tank and the corrosivity of the stored material. Flooring, bottom seams, and roofing are the primary locations of tank failure. Localized corrosion and subsequent tank failure typically occur more rapidly in tanks storing heterogeneous waste solids than in tanks storing relatively homogeneous liquids. Although storage lives greater than 10 years may be achieved for tanks containing solid waste, many cases have been documented where tanks have failed within a few years of initial storage. Periodic maintenance is typically required to prevent these tank failures.

Although SRH is prepared to pursue either of the two approaches to storing PCP contaminated soil, we recommend the waste pile option as the preferred method of soil storage. This recommendation is based on:

- (1) Lowest project cost.
- (2) Least likelihood for project delays and increased costs.
- (3) Lowest time requirement for loading the storage area.
- (4) Lowest time requirement for unloading storage area when desired.

Short term storage of soil in a reinforced, chlorinated PVC lined waste pile should not present environmental risks significantly greater than those posed by soil storage in a metal tank. Long term storage in a waste pile is possible by improving lining grade.

Please call me if you have additional questions regarding this

project. As we discussed over the phone, my tenure as a process engineer at Chevron's 365,000 BPD Richmond Refinery in California included two years as the refinery's first hazardous waste engineer responsible for managing over 40,000 tons per year of hazardous waste. As such, I have an increased understanding of hazardous waste as it applies to the oil industry and have personally worked with equipment similar to that specified in this project. I have no doubt that we can successfully complete the project using either method of storing the soil. As I have outlined, however, tank storage presents additional costs, delays, and other complications to the stabilization project. In return, tank storage has little benefit over an adequately designed and installed waste pile system.

Sincerely,

Steve Locke

Chemical Engineer SRH Associates

#### TABLE 1 - PILE STORAGE COST ESTIMATE

PREPARE STOCKPILE AREA	
LABOR	\$5,300
MATERIAL	\$8,000
MANAGEMENT AND ENGINEERING	\$1,900
TOTAL	\$15,200
EXCAVATE SOILS AND TRANSFER	
LABOR	\$7,900
EQUIPMENT	\$8,000
SUPPORT (DECON, H&S, ETC)	\$6,750
LAB TESTING	\$2,100
MANAGEMENT AND ENGINEERING	\$1,900
TOTAL	\$26,650
PREPARE RECHARGE TRENCH	
LABOR	\$7,300
MATERIAL	\$5,470
MANAGEMENT AND ENGINEERING	\$1,280
TOTAL	\$14,050
STABILIZE STOCKPILE	
LABOR	\$300
MATERIAL	\$2,300
TOTAL	\$2,600
TOTAL ALL PHASES	\$58,500

(NOTE: RENTAL RATES ARE BELOW BLUE BOOK AND DO NOT INCLUDE OPERATING COSTS)

#### TABLE 2 - TANK STORAGE COST ESTIMATE

EXCAVATE	SOILS AND TRANSFER LABOR EQUIPMENT SUPPORT (DECON, H&S, ETC) LAB TESTING MANAGEMENT AND ENGINEERING	\$14,200 \$14,300 \$7,550 \$2,100 \$3,450
	TOTAL	\$41,600
LOAD TAN	KS	
	LABOR	\$7,300
	EQUIPMENT	\$10,100
	SUPPORT (DECON, H&S, ETC)	\$4,000
	MATERIAL	\$300
	MANAGEMENT AND ENGINEERING	\$1,300
	TOTAL	\$23,000
PREPARE I	RECHARGE TRENCH	
	LABOR	\$7,300
	MATERIAL	\$5,470
	MANAGEMENT AND ENGINEERING	\$1,280
	TOTAL	\$14,050
TOTAL AL	L PHASES	\$78,650

#### NOTE:

- \* 37000 BBLS OF TANKAGE REQUIRED FOR SOIL STORAGE
- \* PREPARATION OF TANKS IS NOT INCLUDED IN THIS ESTIMATE
- \* THE INEXPENSIVE CONVEYOR SYSTEM SPECIFIED ABOVE MAY NOT BE ADEQUATE FOR EFFICIENT TANK LOADING
- \* COSTS TO RECOVER SOIL FROM THE TANKS WILL BE MUCH HIGHER THAN THE COST TO RECOVER THE SOIL FROM A PILE

# PROPOSAL FOR SITE REMEDIATION ACTIVITIES TIME OIL COMPANY NORTHWEST TERMINAL PENTACHLOROPHENOL RELEASES

DECEMBER 17, 1987

(Amended June 14, 1988)

## DRAFT

Prepared for: TIME OIL COMPANY 2737 WEST COMMODORE WAY SEATTLE, WASHINGTON

Prepared by:
SRH ASSOCIATES, INC
123 NE THIRD AVENUE SUITE 230
PORTLAND, OREGON 97214

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#### INTRODUCTION

Time Oil Company operates an oil storage facility at 12005 N Burgard Rd. in Portland, Oregon. From 1976 to 1982, Time operated a formulating and blending operation under an agreement with Koppers, Co. to manufacture wood treating chemicals for the forest products industry. Releases of Pentachlorophenol (PCP) from this operation occured during this time, resulting in contamination of soils and, subsequently, groundwater in the area used for this purpose.

Investigatory data generated by Time and its consultants has been summarized in a previous document entitled "Pentachlorophenol Contamination - Northwest Terminal." Since this report was published, contamination of groundwater with PCP has been detected at monitoring well "B." Levels of 2300 and 1000 ppb were detected in the fall of 1987.

This data indicates that contamination from the wood treating chemicals area is migrating from the contaminated soil area via the groundwater route. This proposal represents a modification of the original proposal prepared in December 1987 and addresses the following general tasks:

- 1) Excavation and stabilization of the existing contaminated soil to prevent further migration of contaminants. This task is estimated to require from 3 to 4 weeks for completion with a cost estimate of \$68,200. This price represents an approximately 17t increase over the 1987 proposal estimate, entirely due to increases in material costs and subcontractor fees.
- Replacement of damaged or non-functional existing monitoring wells and the installation of one cluster well for contaminant monitoring and future groundwater recovery purposes. This task is estimated to require from 2 to 4 weeks for completion and may be performed simultaneously with task 1. This task is estimated to cost \$13,840.
- Design, testing, development, construction and operation of a soil washing process to extract contaminants from the soil with provisions for treatment or disposal of the extracted contaminants. An estimate of the cost of design and testing elements of this task is \$32,200, while the other elements, contingent upon the design and testing results, cannot be approximated. The time required for completion for all phases of this task cannot be determined at this time. Phase 3A (Select soil washing solution) can be accomplished at this time for an estimated cost of \$8,170, based on current laboratory analytical rates. This phase will require approximately 8 to 10 weeks for completion.

790,210

4) Recovery and biological treatment of contaminated groundwater. A rough budgetary estimate for the design of the completed system and the construction of the groundwater recovery network is \$28,000. The construction and operation costs of the treatment system are contingent on the design parameters and the determination of the depth of groundwater contamination. The time required for completion cannot be determined at this time.

While tasks 1 and 2 can be reasonably predicted from what is currently known about the Northwest Terminal site, tasks 3 and 4 include several assumptions regarding such factors as the extent of groundwater contamination, regulatory cooperation, and equipment availability and lead times. Because of these considerations the cost estimates ventured for tasks 3 and 4 are subject to significant potential error.

#### 1. EXCAVATION AND STABILIZATION

Since the migration of PCP into the groundwater system underlying the Northwest terminal has been detected and confirmed, the objective of primary importance to TOC is containment and stabilization of the PCP source. SRH proposes that the contaminated soils be excavated using a bucket excavator, front end loader and end dump trucks, and placed on an impervious liner in a secure area of the Northwest terminal property. Before the initiation of actual work, a detailed work plan will be prepared for review by TOC.

The excavation and movement of the soil would be performed by personnel trained in hazardous waste activity and having necessary medical monitoring and surveillance as required by OSHA and the State of Oregon Accident Prevention Division to limit liability to TOC. Other provisions of RCRA and other state and federal regulations will be followed, as they are relevant and applicable to this operation.

The soil would be removed according to contamination contours described in the October 1986 report. A 500 ppm cleanup standard is proposed based on initial discussions with TOC. An estimated 2700 cubic yards of soil is involved which will result in an excavated volume of approximately 3700 cubic yards due to expansion.

SRH proposes that the material be placed on a flat area of TOC property south of the tank farm area. A soil berm would be constructed from natural soils using a dozer and the stockpile site lined with an impermeable, reinforced synthetic material. SRH proposese to use a 40 mil thick PVC liner, based on its durability and availability. The edges of the liner would be anchored in the berm to prevent slippage. Following placement of the soil in the stockpile, the area would be covered with a

second PVC liner, 10 mils thick, to protect the surface from erosion at minimal cost.

The contained stockpile would thus be isolated from the environment and would cease to release PCP to the environment while providing a convenient location for transfer of the soil to the subsequent treatment operation.

The excavation site would be backfilled with native materials from a borrow site located on ToC property, following the placement of an infiltration gallery for treatment of groundwater. The groundwater treatment operation and infiltration gallery is discussed below.

The stabilization of the contaminated soil is, in SRR's opinion, the most crucial element of this proposal and should be initiated at TOC's earliest convenience.

Time to complete task 1 = 3 - 4 weeks following receipt of liner.

Cost estimate, task 1 = \$68,200 -

#### 2. RETROFIT OF MONITORING WELLS

Since several of the well points installed by TOC have been damaged or were ineffective as monitoring wells for a number of reasons, SRH proposes to install new 2" PVC monitoring wells at existing locations A, E, and G. A new well at existing location B would be a 5" diameter well to provide a point for future groundwater recovery, allowing this well to serve a dual function and thereby reduce costs. The use of 5" well casing is a modification of the original proposal selected to allow for significantly shorter lead times in driller and material availability.

A new cluster well with completion depths at 15, 25 and 35 feet below the ground surface would be installed between monitoring well locations B and 4 to determine the vertical extent of PCP contamination. These wells would also be constructed of 5" diameter casing to allow for groundwater recovery. If it can be determined that placement of recovery wells at this location is inappropriate, 2" wells will be installed to reduce project costs.

Time to complete task 2 = 2 - 4 weeks Cost estimate, task 2 = \$13,\$40

#### 3. SOIL TREATMENT

The assessment of alternatives for soil treatment or disposal have been previously addressed by SRH. The recommended technology for soil treatment was determined to be liquid extraction of the contaminants (soil washing). This technology was determined to have the lowest overall costs to TOC. Several advances have occured in the research of soil washing technology since the feasibility assessment was performed. However, no commercial operation exists yet for PCP. Because of the status of this technology, SRH proposes that the development of the soil treatment process for TOC be performed in several discrete steps. These steps are described below.

#### A. SELECT SOIL WASHING SOLUTION

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A variety of compounds exist that have the potential to wash PCP from TOC's soil. The extraction solution providing optimum properties for removal of the PCP will be determined using jar tests. Jar tests are inexpensive methods for evaluating the efficiency of different extraction solutions in a batch process. SRH proposes to perform these tests at TOC's Northwest Terminal facility using samples of soil obtained from the site. Chemical analyses, as necessary, will be performed by a laboratory of TOC's choice. The estimated cost for this task is \$8,170.

#### B. <u>DESIGN SOIL CONTACTOR</u>

The vessel in which the soil will be brought into contact with the washing solution will be designed based on the soil washing solution selected in step A. The system will provide total immersion of contaminated soils in the soil washing solution. This process will utilize a high shear system with a pug mill or similar device to ensure complete contact with the washing solution. Based on the results of the jar tests performed in step A, a single or multiple stage contactor will be selected.

#### C. <u>DESIGN SOIL RINSER</u>

After the soil has had sufficient contact with the washing solution, it will be rinsed with a non-hazardous liquid, such as water, to remove residual extractant and to recover the cleaned soil particles for return to the excavation site or other location of TCC's choice. The rinser will incorporate a filter press and solid/liquid recovery system. The rinser will allow for the recovery of the removed PCP in a tank or other vessel for subsequent liquid treatment.

### D. DESIGN LIQUID TREATMENT SYSTEM

The recovered soil washing solution containing PCP will be treated to remove and/or destroy PCP and any other hazardous contaminants. The design of this system will be based on the previous systems and will use physical and chemical techniques for separation and purification.

Time to complete task 3, steps A - D = 8-12 weeks

Budgetary cost estimate, task 3, steps A - D = \$32,200

A= 8170 B-D=24,030

#### 4. GROUNDWATER TREATMENT

The contaminated groundwater at TOC represents the primary pathway for PCP migration off-site. The objective of the groundwater recovery network discussed above will be to pump contaminated groundwater to a surface treatment unit for bacterial degradation of PCP. The treated groundwater will be reintroduced into the upper aquifer to flush out contaminants and to introduce nutrients and oxygen necessary to promote "in situ" bacterial degradation of PCP.

The final design of this system is closely tied to the findings from the renovated groundwater monitoring system described above, the failure of which has restricted conclusions regarding the precise extent of groundwater contamination at TOC. Recovery well locations and pumping rates are examples of the type of conclusions that can be affected by the groundwater monitoring data.

The groundwater treatment system will include a recovery well network, using existing wells to the maximum extent possible, a pumping system to deliver the recovered water to an aerobic biological reactor and an infiltration gallery at the site of the original contamination to discharge treated water and to implement flushing of the soil column at this location.

Time to complete task 4 = 6-10 weeks

Budgetary cost estimate, task 4 = \$28,000, exclusive of treatment system construction and operation.

#### SUMMARY

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Time Oil Co. has indicated that the performance of items 1, 2, and 3A is of immediate interest and benefit to them. The summary cost estimate for performance of these tasks is \$92,900 and includes posting of a performance bond in the amount of the contract and inclusion of Time as a named co-insured on SRH's broad form comprehensive public liability insurance.

## DRAFT

#### CONSTRUCTION CONTRACT

#### ENVIRONMENTAL CLEAN-UP

THIS CONTRACT is made as of the day of 1988, at Seattle, Washington, by and between Time Oil Co., a Washington corporation ("Time" herein), located at 2737 West Commodore Way, Seattle, Washington 98199, and S.R.H. Associates, Inc., ("Contractor" herein), located at 123 N.E. Third Avenue, Portland, OR 97232, for work relating to environmental clean-up at 12005 North Burgard Road, Portland, OR ("Northwest Terminal").

IT IS AGREED by and between the parties hereto as follows:

- WORK TO BE PERFORMED: The Contractor hereby agrees to perform services in accordance with the "Scope of Work" as defined in the attached document entitled "PROPOSAL FOR SITE REMEDIATION ACTIVITIES, TIME OIL COMPANY NORTHWEST TERMINAL, PENTACHLOROPHENOL RELEASES" (Proposal) dated December 17, 1988. Contractor admits that the Scope of Work is sufficient for their intended purpose, and that work can be successfully executed in accordance therewith. Time may make any alterations, deviations, additions or omissions from the aforesaid Scope of Work, without affecting or making void this contract, however, no work other than as provided herein or specifically authorized by Time in writing shall become a part of this contract. Additional work is to be authorized only in writing.
  - a. Before the initiation of the following detailed work plan for Time's approval in accordance with tasks 1, 2 and 3a of SRH proposal dated December 17, 1987, as amended on June 14, 1988, copies of Which are attached hereto and made a part of this contract by reference.
  - b. Excavate 2,700 cubic yards of soil contaminated with pentachlorophenol (PCP) in excess of 500 ppm as agreed to by Time prior to excavation and place it on a liner as described in the proposal. Install an infiltration gallery in the excavated site for the purpose of enhanced bioremediation. Backfill with soil from a borrow site located on the terminal property as directed by Time.
  - c. Replace existing well points A, E and G with 2" PVC monitoring wells. Replace existing well point B with a 5" diameter well suitable for groundwater recovery. Install a cluster of 5" diameter PVC wells located

9021

between existing points B and 4 having completion depths of 15, 25 and 35 feet below ground to determine the vertical extent of PCP contamination.

- d. Conduct tests to determine the optimum extraction solution for "washing" PCP from the soil at Northwest terminal.
- 2. PRICE: Time agrees to pay Contractor ninety-two-thousand-and-nine-hundred (\$92,900.00) dollars, plus state sales tax, if applicable, which amount shall be referred to herein as the "contract price". Any change to the contract price may only be made by written change order or other writing executed by both parties hereto. Any work performed which is not covered by a written change order shall be considered fully paid for upon payment of the contract price.
- 3. TERMS OF PAYMENT: Progress billings are to be made after each 30-day period of this contract for work completed as of that date. Time will pay such billings less ten percent retainage. Final payment is to be made after acceptance of the completed project by time.
- 4. BOND: Contractor agrees that before commencement of any work hereunder it will promptly furnish Time with a faithful performance bond issued by a surety company acceptable to Time in an amount equal to the total contract price guaranteeing completion of all work and performance of all obligations hereunder. Said bond shall cover any subsequent changes, modifications or amendments to this contract without the prior consent of the surety.
- 5. TIME FOR PERFORMANCE: All work shall be completed within twelve weeks from the date of this contract, exclusive of permit approval by government agencies.
  - 6. INSURANCE: Until completion of its performance hereunder, Contractor agrees to maintain Workmen's Compensation Insurance in the form and amounts required by state law, and Broad Form Comprehensive Public Liability with minimum limits of \$1,000,000.00 per person and \$1,000,000.00 per accident for bodily injury and \$500,000.00 per accident for property damage. Contractor shall promptly deliver to Time certificates of said insurance naming Time as an additional insured before commencing work and such certificates shall provide that said insurance shall not be cancelled prior to thirty (30) days written notice to Time.

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- <u>PERMITS</u>: Contractor agrees, at his expense, to obtain all permits, licenses and approvals, except those 7. involved with treatment, storage or disposal hazardous wastes, applicable to Contractor's activities pursuant to the Scope of Work. Contractor will, after agreement with Time, obtain any necessary permits or licenses required for the treatment, storage or disposal of hazardous waste. The fee for such work will be agreed to in writing prior to work on such permitting activities, although considered part of this contract. Contractor will comply with all laws, rules, zoning ordinances, regulations and requirements now or hereafter existing, except that any new regulations, laws, rules or ordinances that affect the work and cause additional expense or require additional time to comply with by Contractor, shall be at the expense of Time. Time shall have the right to withhold from any payments due hereunder an amount sufficient to compensate it for any damages it may incur of Contractor's failure to secure any necessary permit of comply with any law or regulation.
- 8. <u>ASSIGNMENT</u>: Contractor shall not assign or transfer this contract, or any interest therein or any part thereof, without the consent in writing of Time.
- 9. GUARANTEE: Contractor agrees to perform all work in a workmanlike manner and guarantees all work will be free from defects in material and labor for a period of one year after completion. No payment made under this contract shall be construed to be an acceptance of defective work or improper materials. Contractor further guarantees that it is familiar with the work site and scope of work and is competent to perform the work described within the time stated herein.
- 10. LIENS: Contractor covenants that no liens will attach against the subject premises for material or labor arising from the work herein contemplated. If at any time there shall be evidence of lien or claim for which, if established, Time may become liable, and which is chargeable to Contractor, Time shall have the right to retain out of any payment then due, or thereafter to become due, an amount sufficient to completely indemnify Time against such lien or claim, should there prove to be any such claim.
- 11. INDEMNITY: Contractor agrees to indemnify Time and hold Time harmless from any and all claims, liabilities, demands, actions, costs and expense (including attorneys' fees) of whatsoever nature, arising out of any acts or omissions of Contractor, its agents or employees, hereunder. The parties recognize that even with the utmost care being exercised, escape

of polluting substances might occur while Contractor is rendering services under this Agreement. It is therefore agreed that to the extent such escape shall occur that the responsibility to governmental authorities for such escapement is that of time, and that Time agrees to indemnify and hold Contractor harmless of and from any loss, damage, injury, liability or claim resulting from an aggravation of the existing pollution problem which is not caused by the negligence of Contractor.

- 12. <u>REMEDIES</u>: All rights and remedies of Time herein shall be cumulative, and no right or remedy shall be exclusive of any other, and the pursuit of any such right or remedy shall not be deemed a waiver of any other or different remedy or relief to which Time might otherwise be entitled by law or inequity.
- 13. FORCE MAJEURE: Contractor shall not be held liable for delays resulting from fire, earthquakes, war, or acts of any government, whether foreign or domestic, or any other cause beyond his control. However, Contractor has specifically taken into account and shall be held liable for potential delays caused by labor disturbances, material availability and weather.
- 14. INTERPRETATION: This contract will be deemed executed and shall become binding and of full force and effect when signed by Time at its office by its authorized representative. This contract incorporates the entire agreement between the parties except as modified by written change order of other written agreement signed by both parties.
- 15. <u>APPLICABLE LAW</u>: The nature, validity and interpretation of this contract shall be governed by the laws of the State of Washington.

DATED	DATED		
TIME OIL CO.	SRH ASSOCIATES, INC.		
Ву:	Ву:		

COST SUMMARY

Deillors: Not pleased wr Centechnical Explorations

TASK 2.0 - RETROFIT OF MONITORING WELLS

TIME OIL COMPANY NORTHWEST TERMINAL PENTACHLOROPHENOL RELEASES

Prepared By:

SRH Associates, Inc. 123 N.E. Third Avenue, Suite 230 Portland, Oregon 97232 (503) 232-0824

August 11, 1988

The following cost summary is provided to Time Oil Company (Time) at their request.

I. Replacement monitoring wells for locations A, E, and G.

Three, two-inch diameter monitoring wells with a twenty-foot screen bottom depth:

Bstimated cost = \$4,100

II. Replacement monitoring well for location B.

One, five-inch diameter monitoring well with a twenty-foot screen bottom depth:

Estimated cost = \$1,600 -

III, New, three well cluster, between locations B and 4.

Five-inch diameter monitoring well cluster, with screen bottom depths of 15, 25 and 35 feet:

Estimated cost = \$5,100

IV. Additional estimated cost for double cased well in cluster providing driller has proper equipment):

Estimated cost = \$1,200

V. SRH Associates, Inc. well design, construction supervision, testing, documentation, and project management.

Estimated cost = \$3,140

Original Cost Estimate (June 14, 1988): \$13,940 plus \$1,200 (above)
New Cost Estimate: \$15,140.

Pump Test (2 600) PCP A

PCP Analysis 6 @ FILO =660 EPA 8040A PCP+TCP=110 EPA 8040A PCP alm = 855 Remob = 300

	9/26/83	
	NW Wells - 5RH	
ومنا هم معمد المحاد	6" 20,28 = 38" BL BZ 20' + 28' 2"	
	1. 3- Claster Wells + Well B (stella + Deep) + G (shallow)	
	A. Sample for Vertical confam gradient	
	B. Pump tests - one on deep & one on shallow	well
	use B, D, F, H, &I + 2 other cluster wells 5/observed	
	3. Becovery Wells	······································
	To catch leachate, best have well in leach field	<del> </del>
	•	
	2. Establish Location for a Monitoring/ recovery wells	
	A Based on Samplin all walls	
	A Based on sampling all wells  B. Besid on Dump tot data	
	Replace B & G (C-laver)	
10/1	3 Sam RoHermel	_
	Toller - Paller Pour i Toller	
	19,007 - leaving steel casing in ground raises price	
	Just the driller's costs	·
	On first did driller did not understand double casing	o .
		/
10/13	Ecola - Mack Andr	
	Ecova - Mark Anderson Gave new spees, reguested new cost	****
annan v iz inau i human ar la Hillionae i	Just of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state	
	TOLS011094	

14.1

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SMAJOOG. PHENOL, PENTACHLORG-
CAS: 000087865
                                                                                                                                                                                                                                                                                                                                          SM85750. PHENGL, 2-PROPERTYL- with BENZ(G)ANTHRACENE, 7,12-DIMETHYL-
DEF;7,12-DIMETHYLBENZ(G)ANTHRACENE used as an initiator (CNREAS
                                                                                                                      MW: 266.3
* DOWICIDE G
                                       CAS: 00008784S
SYN: CHLOROPHEN
PCP PENCHLOROL PENTA
PENTACHLOROPHENOL PENTACHLOROPHENATE
PENTACHLOROPHENOL PENTACHLOROPHENOL
PENTACHOROFENOL (Italian)
PENTACLOROFENOLO (Italian)
PENWAR SANTOBRITE
SINITUMO WEEDONE
272XA3 - 256.63
                                                                                                                                                                                                 MOLFM: Q-CIS-CA-H
DOWICIDE 7
                                                                                                                                                                                                                                                                                                                                                                                            19.413.591
                                                                                                                                                                                                                                                                                                                                         TXDS: ske-mus FDLo:3400 mg/kg/12W1
TFX.NEO
SMEGGG, PHENGLS, TETRACHEDRO-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CNREAS 19,413,59
                                                                                                                                                                                                                                                                                                                                     SMESSES. PHENOLS, TETRACHLORS.

SYN. TETRACHLOROPHENOLS

STATUS: FEA PESTICIDE CANDIDATE FOR ADDITIONAL ONCOLOGICAL INFORMATION AS OF FEBRUARY 1976

SMESSES, PHENOLS, TETRACHLORO, POTASSIUM SALT

MW: 270.9 MOLFM: O-CU-CG-H2 K

SYN: POTASSIUM SALT OF TETRACHLOROPHENOLS

STATUS: FEA PESTICIDE CANDIDATE FOR ADDITIONAL CHCOLOGICAL INFORMATION AS OF FEBRUARY 1976

SMESSES, PHENOLS, TETRACHLORO, ALKYL AMINE SALT

DEF-AIKYI groups occur in forty ocids of coconur oil (FEREAC 41,728-76)

SYN: TETRACHLOROPHENOLS ALKYL AMINE SALT
                                       PENWAR SANTOBRITE
SINITUMO WEEDONE
TXDS: orl-hmn LDLo:29 mg/kg
orl-rat LD50:50 mg/kg
skn-rat LD50:105 mg/kg
ipr-rat LD50:56 mg/kg
scu-rat LD50:100 mg/kg
scu-mus TDLo:40 mg/kg
scu-mus TDLo:40 mg/kg
scu-rat LD0:70 mg/kg
vkn-rat LD0:70 mg/kg
U.S. OCCUPATIONAL STANDARD USOS-
gir:TWA S00 ug/m3
                                                                                                                                                                                                                    27ZXA3 - 256.63
FMCHA2 - 0-154.75
8JIMAG 26.59.69
BJPCBM 13,20.58
FEPRA7 2,76.43
NTIS** PB223-159
JPETA8 76,104.42
JPETA8 76,104.42
JPETA8 76,104.42
FEREAC 37,23540,74
                                                                                                                                                                                                                                                                                                                                                                               41,7282,76)
SYN: TETRACHLOROPHENOLS, ALKYL AMINE SALT
STATUS: EPA PESTICIDE CANDIDATE FOR ADDITIONAL ONCOLOGICAL
INFORMATION AS OF FEBRUARY 1976
PHENOL, 2,3,46-TETRACHLORO-
CAS. 000058902 MW: 2318 MOLFM: O-CI4-C6-H2
SYN: DOWNCIDE 6 "TCP" 2,3,46-TETRACHLOROPHENOL
  STATUS: EPA-SELECTED FOR PRIORITY ATTENTION AS POINT SOURCE WATER EFFLUENT DISCHARGE TOXIC POLLUTANT SM71758. PRENOL -6.-PENTYL- with BERZIEJANTHACENE, 7,12-DIMETHYL- DEF:7,12-DIMETHYLBERZ(a)ANTHRACENE used as an initiator (CNREAB 19,413,59)
                                                                                                                                                                                                                                                                                                                                         SYN: DOWNCIDE 6 TCP 2.3.4.

2.4.5.6-TETRACHLOROPHENOL
TXDS: orl-ret L050: 140 mg/kg
ipr-mus L050: 130 mg/kg
ipr-mus L0Lo:250 mg/kg
scu-mus T0Lo:100 mg/kg TFX:NEO
orl-gpg L050:250 mg/kg
SMY5000, PHENOL, TETRACHLORO-, SOONUM SALT
MW: 238.8 MO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IMSUAL 39,56,70
BIPCBM 13,20,58
CBCCT* 4 231,52
NTIS** PB223-159
FMCHA2 +:0-200,75
                                          TXDS: skri-mus TDLo:4100 mg/kg/12WI
                                                                                                                                                                                                                      CHREAR 19 413 50
   TEX.NEO
SM72500. PHENOL, P.PENTYL. WITH BENZ(G)ANTHRACENE, 7,12-DIMETHYL.
DEF.7,12-DIMETHYLBENZ(G)ANTHRACENE used as an initiator (CNREAB
                                                       19,413,59)
                                           TXDSi skin-mus TDLo:4100 mg/kg/12WI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  MOLFM: CI4-C6-H2 .No
                                                                                                                                                                                                                     CNREAS 19,413,59
                                                                                                                                                                                                                                                                                                                                                                              MW: 238.8 MOLFM: CIA-C6-H2 NG
SYN: SODIUM TETRACHLOROPHENATE TETRACHLOROPHENOL
SODIUM SALT
STATUS: FPA PESTICIDE CANDIANTE FOR ADDITIONAL ONCOLOGICAL
INFORMATION AS OF FEBRUARY 1976
PRESSOL, p-(1,1,3,3-TETRAMETHYLBUTYL) with BENZ(s)ANTHRACENE,
7,12-DIMMETHYL
  TFX.HEO

SM75250. PHENOL, p.(s-PENTYL)- with BENZ(s)ANTHRACENE, 7,12-DIMETHYL-
OEF-7,12-DIMETHYLBENZ(d)ANTHRACENE used as an initiator (CNREAB
                                                       19,413,59)
                                         TXDS: skn-mus TDLa:4100 mg/kg/12WI
TFX:NEO
                                                                                                                                                                                                                     CNREAS 19,413,59
TFX:NEO
SM75460. PMEMOL, p-tort-PENTYL-, POTASSIUM SALT
MW1 203.3 MOLFM: O-C11-H16 .K
SYN: POTASSIUM SALT OF p-tort-AMYLPHENOL
STATUS: EPA PESTICIDE CANDIDATE FOR ADDITIONAL ONCOLOGICAL
INFORMATION AS OF FEBRUARY 1976
SM75450. PMEMOL, p-tort-PENTYL-, SOOMIM SALT
MW1: 187.2 MOLFM: O-C11-H16 .Ne
SYN: SODIUM SALT OF p-tort-AMYLPHENOL
STATUS: EPA PESTICIDE CANDIDATE FOR ADDITIONAL ONCOLOGICAL
INFORMATION AS OF FEBRUARY 1976
PMEMOL, p-MITRO-, 0-ESTER with 0,0-DIMETRITY PNOSPHOROTHMOATE SOOI
TOO1750
PMEMOL, p-MITRO-, 0-ESTER with 0,0-DIMETRITY PNOSPHOROTHMOATE SOOI
TOO1750
PMEMOL, p-MITRO-, 0-ESTER with 0,0-DIMETRITY PNOSPHOROTHMOATE SOOI
                                                                                                                                                                                                                                                                                                                                                                                DEF:7,12-DIMETHYLBENZ(QIANTHRACENE used as an intriotor (CNREAB
                                                                                                                                                                                                                                                                                                                                                                                           19 413 591
                                                                                                                                                                                                                                                                                                                                                                                TXDS: ske-mus TC
                                                                                                                                                                                                                                                                                                                                                                                                                                       TOLo:5300 mg/kg/12WI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CNREAS 19,413,59
                                                                                                                                                                                                                                                                                                                                        TEX.HEO
PHENDEL, & PHENDEL, & AMMONIBM SALT SEE: BS30000

SN05256, PHENDEL, 2,2"-THOBIS(4,6-DICHLORD).

CAS. 000097187 MW. 356.0 MOLFM: 02.5-C14-C12-H6
SYN: ACTAMER BIDIPHEN BIS(2.HYDROXY-3.5-DICHLOROPHENYL) SULFIDE BITHOMOL BITHOMOL SULFIDE BITHOMOL CP 3428
2,2"-DIHYDROXY-3,3"-5,5"-TETRACHLORODPHENYLSULFIDE 2-HYDROXY-3,5"-DICHLOROPHENYL SULPHIDE COROTHOOL LOROTHODOL NEOPELLIS TOP 2,2"-THOBIS(4-6-DICHLOROPHENOL)

VANCIDE BL XL 7
TG01750
PHENGL, 6-MENTL, ALENYL AMME SALT
TG01750
PHENGL, 6-MENGL, JOHNM doirt, see: DV77000
SM82300. PHENGL, 6-MENTL, ALENYL AMME SALT
DEF-ARKENYL CONSISTS of 100% CB-C18 (FEREAC 41,7279,76)
SYN: ALKENYL AMINE SALT OF 6-PHENYLPHENGL
STATUS: FPA PESTICIDE CANDIDATE FOR ADDITIONAL ONCOLOGICAL
INFORMATION AS OF FEBRUARY 1976
SM82400. PHENGL, 6-MENTL, ALKYL AMME COPPER SALT
DEF-ARKY CONSISTS OF 100% CB-C18 (FEREAC 41,7279,76)
SYN: ALKYL AMINE COPPER SALT OF 6-PHENYLPHENGL
STATUS: FPA PESTICIDE CANDIDATE FOR ADDITIONAL ONCOLOGICAL
INFORMATION AS OF FEBRUARY 1976
SYN: ALKYL AMINO ZINC SALT OF 6-PHENYLPHENGL
STATUS: FPA PESTICIDE CANDIOATE FOR ADDITIONAL ONCOLOGICAL
INFORMATION AS OF FEBRUARY 1976
SYN: ALKYL AMINO ZINC SALT OF 6-PHENYLPHENGL
STATUS: FPA PESTICIDE CANDIOATE FOR ADDITIONAL ONCOLOGICAL
INFORMATION AS OF FEBRUARY 1976
PHENGL, 6-PHENYL, SOR DYS7750
                                                                                                                                                                                                                                                                                                                                                                              VANCIDE 8L XL 7

TXDS: orl-rat LD50:70 mg/kg
orl-mus LD50:900 mg/kg
orl-mus TDL0:12 gm/kg/78W/C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CLDNO*
PCOC** -,134,66
NTIS** F8223-159
                                                                                                                                                                                                                                                                                                                                                                                                                  TEXINEO
                                                                                                                                                                                                                                                                                                                                                                              ipr-mus LDLo:100 mg/kg
PNEHOL 2,2'-TN10815(4,4-DICHLORG-
CAS: 006385586 MWr 400.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NTIS** AD277-689
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MOLFM: 02-5-CI4-C12-H4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MW: 400.0
                                                                                                                                                                                                                                                                                                                                                                                                                THONOL, SODHUM SALT "DISODIUM 2.2-THIOBIS(4,6-
DICHLORPMENOXIDE) "SODHUM BITHIONOLATE "
SODHUM, (2,2-THIOBIS(4,6-DICHLORO-0-PHENYLENE)OXYDDI-
"2,2-THIOBIS(4,6-DICHLORO-0-PHENYLENE)OXYDDI-
(THIOBIS(4,6-DICHLORO-PHENOL) DISODIUM SALT
                                                                                                                                                                                                                                                                                                                                                                              SYN: BITHIONOL, SODIUM SALT DICHLORPHENOXIDE)
INFORMATION AS OF FEBRUARY 1976
PRICHOL --PRENTL - See: DV97730

SM8308. PRENTL - See: DV97730

CAS: 001689823 MW: 198.2 MOLFM: N2-0-C12-HI
SYN: ATUL BRILLIANT OIL YELLOW G P-BENZENEAZOI

C.I. SOLVENT YELLOW 7 FAST OIL YELLOW
OC.I. SOLVENT YELLOW 7 FAST OIL YELLOW
ORGANOL YELLOW AP P-PRENTLAZOPHENOL
ORGANOL YELLOW AP P-PRENTLAZOPHENOL

TXDS: ipr-mus L050:75 mg/lsg NTIS** AD691-
REVIEW: CARCINOGENIC DETERMINATION:INDEFINITE

STATUS: NOSH CANDIDATE SUBJECT FOR HAZARD REVIEW
(CARCINOGENESIS)
                                                                                                                                                                                                                                                                                                                                                                              VANCIDE BN
TXDS: orl-ret LDS0:492 mg/kg
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PCOC" -.136.66
NTIS" P8223-159
                                                                                                                                                                                            MOLFM: N2-O-C12-H10

* p-BENZENEAZOPHENOL

W 0 * C.L 11800 *

FAST OIL YELLOW 2G *
                                                                                                                                                                                                                                                                                                                                                                                                       ort-mus TDLo:770 mg/kg/78WIC
                                                                                                                                                                                                                                                                                                                                                                             ori-miss I DL6://O mg/kg//RWIC
TRX.NEO
PNENOL, 2,4,6-TRICINGOS-
CAS: 00008062 MW: 197.4
SYN: DOWICIOE 25 OAMAL *
TRICHLORFENOL (Czech) *
                                                                                                                                                                                                                                                                                                                                        SN15758. PI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MOLFM: O-CI3-C6-H3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PHENACHLOR 2,4
2,4,6-TRICHLOROPHENOL
PCOC**.1176,66
BJPCBM 13,20,58
NTIS** PB223-159
                                                                                                                                                                                                4-HYDROXYAZOBENZENE
p-PHENYLAZOPHENOL
                                                                                                                                                                                      PIROCARD GREEN 491
NTIS** AD691-490
IARC** 8,157,75
                                                                                                                                                                                                                                                                                                                                                                              TXOS: ori-rat L050:820 mg/kg
ipr-rat L050:276 mg/kg
ori-mus TDLo:29 gm/kg/78WIC
                                                                                                                                                                                                                                                                                                                                                                             TFX:CAR
STATUS: CURRENTLY FESTED BY NO! FOR CARCINGGENICITY BY
STATUS: NOSN CANDIDATE SUBJECT FOR HAZARD REVIEW
(CARCINGENESIS)

SM83200. PHENDL, &-PMENYL-, POTASSIUM SALT
MW: 209 3 MOLFM: 0-C12-H10 .K

SYN: 2-BIPMENYLO, POTASSIUM SALT * POTASSIUM SALT OF

G-PHENYLPHENOL

STATUS: EPA PESTICIDE CANDIDATE FOR ADDITIONAL ONCOLOGICAL
INFORMATION AS OF FEBRUARY 1976

SM83400. PHENDL, &-PHENYL-, TETRABECYLAMME SALT

MWW. 2015. DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE: DATE
                                                                                                                                                                                                                                                                                                                                                                             STANDARD BIOASSAY PROTOCOL AS OF APRIL 1975
PHENOL, 2,4,5-TRICHLORD- with BENZ(s)ANTHRACENE, 7,12-DIMETHYL-
DEF-7,12-DIMETHYLBENZ(G)ANTHRACENE used as an initiator (CNREAB
                                                                                                                                                                                                                                                                                                                                                                                          19,413.59)
                                                                                                                                                                                                                                                                                                                                                                             19,413.59)
TXOSs skin-mus TDLo-6700 mg/kg/16WI CHRE/
TXOSs skin-mus TDLo-6700 mg/kg/16WI CHRE/
TFX:NEO
PHENOTISTEALINE HYDROCHLORIDE see: MV90000
PHENOPISTE ORGANIOL REO 8 see: QL57750
PHENOPISTEALINE SEE: VC42000
PHENOXYEENZAMIDE HYDROCHLORIDE see: DP37500
PHENOXYEENZAMIDE HYDROCHLORIDE see: DP37500
PHENOXYEENZAMIDE HYDROCHLORIDE see: DP37500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CHREAS 19,413.59
                                      SYN, 2-BIPHENYLOL, TETRADECYLAMINE SALT *

TETRADECYLAMINE SALT OF 0-PHENYLPHENOL
STATUS: FPA PESTICIDE CANDIDATE FOR ADDITIONAL ONCOLOGICAL
INFORMATION AS OF FEBRUARY 1976
                                                                                                                             MW: 383.6
                                                                                                                                                                                                                                                                                                                                                                                PHENGRYBENZAMINE 500: DP35000
PHENGRYBENZAMINE HYDROCHLORIDE 500: DP37500
```

UNEVALUATED DATA-SUBSTANCES SHOULD NOT NECESSARRY BE CONSTRUED AS PROVEN AMMAL OR HUMAN CARCINOGENS